National Park Service
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Natural Resource Stewardship and Science

Vegetation Inventory

Saratoga National Historical Park, New York

Natural Resource Technical Report NPS/NETN/NRTR—2014/869



ON THE COVER
Successional fern meadow within Saratoga National Historical Park. Photograph by: Gregory J. Edinger, NY Natural Heritage Program.

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Executive Summary

The National Park Service – National Vegetation Inventory Program (NPS NVIP) funded an effort, beginning in 2003, to classify and map the vegetation of Saratoga National Historic Park (SARA) and create current digital geospatial databases. The inventory work was performed by SARA staff, NPS Northeast Region, New York Natural Heritage Program (NYNHP), North Carolina State University (NCSU) Center for Earth Observation, NatureServe, and Cogan Technology, Inc. The Northeast Temperate Network, Inventory and Monitoring Program (NETN) coordinated the effort.

To classify the vegetation, 185 representative classification plots were sampled throughout SARA using traditional phytosociological methods (i.e., relevé sampling). The relevé plots were located and sampled primarily in 2003-2005. Three hundred and three (303) vascular plant species were recorded; the plot data were classified into 42 vegetation associations using accepted statistical analyses. An additional 11 associations not represented by relevé plots and all 53 associations were described in detail. A dichotomous field key was developed for these vegetation associations to assist with field recognition and classification.

Three NYNHP natural communities established within SARA represent significant occurrences from a statewide perspective, they are: (1) floodplain forest (combination of seven floodplain vegetation associations); (2) vernal pool (Eastern Woodland Vernal Pool association); and (3) successional fern meadow (Bracken Grassland association). The floodplain forest established along the Hudson River near Bemis Heights is a very good example and surprisingly supports a low number of invasive/exotic plant species characteristic of this community; this stand is the first significant occurrence of floodplain forest to be surveyed and documented by NYNHP on this reach of the Hudson River north of Troy, NY. The diversity and distribution of vegetation associations within SARA are primarily a result of four factors: (1) the geologic history of the region, particularly glaciation; (2) location along the Hudson River within a temperate climate; (3) the diverse topography including ravines, high-level hills, floodplains, and basin wetlands; and (4) the setting within a rural agricultural landscape with both historic and ongoing land use practices.

In 2003, a preliminary vegetation map of SARA was created using NYNHP ecological communities as map units (Edinger et al. 2002); this map was used to plan the vegetation classification plot sampling strategy. Classification plot sampling provided the data for statistical analyses to create the classification and refine map units. A revised preliminary map was created using U.S. National Vegetation Classification (USNVC) vegetation associations and Anderson Level I and II land use categories for mapping units, prior to AA field sampling. This revised preliminary map was used in spring 2006 to plan the thematic AA strategy for the USNVC portion of the map. Following field sampling of 231 AA points in summer 2006 and analysis of the AA data, a final vegetation type and land use map was created in 2007, resulting in corrected USNVC associations and Anderson Level I and II land use categories. In addition, a separate map of wetlands within SARA was created from the final vegetation association map. The final map covers 3,186 hectares (7,869 acres) of USNVC or Anderson Level I and II classes; of this total, 1,169 hectares (2,887 acres) occur within the boundaries of SARA.

Overall thematic accuracy for the portions of the final vegetation map, as based on the sampling design from the 2006 revised preliminary map, was estimated at 47.2% at the USNVC association level (43 thematic units) and 66.4% at the USNVC group level (19 thematic units). Map classes that were labeled as Anderson land use classes were not assessed.

All plot and AA point photographs acquired during this project were archived. The standard deliverables were produced as described and presented herein and stored on the digital video disk or flash drive distributed with this report.

This final report includes vegetation association descriptions, the field key to vegetation associations, description of the physiognomic map classes and photo-signatures, AA information, and project methods and results. Additional products of the project include a spatial GIS database containing the attributed vegetation polygons, classification plots, and AA points, digital photographs characterizing classification plots and landscape features/objects of interest within SARA, and metadata for project spatial data that are Federal Geographic Data Committee (FGDC)-compliant.

Keywords: vegetation association, vegetation classification, vegetation mapping, Saratoga National Historical Park, Battlefield Unit, Old Saratoga Unit, Saratoga Monument, Schuyler House, Victory Woods.

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New York Natural Heritage Program (NYNHP) staff and former staff contributed significantly to this project. Timothy Howard assisted with database programming and management and statistical analyses. Stephen Young contributed valuable botanical expertise to this project. John Schmid prepared nearly all report maps, generated Accuracy Assessment (AA) Destination Points to survey, reviewed GIS digital layers, and completed GIS metadata requirements. Jennifer Garrett, formerly with NYNHP, surveyed AA Destination Points and assisted with initial report template preparation. Tara Seoane assisted with report formatting. Carly Voight, formerly with NYNHP, assisted with plot sampling.

Elizabeth Eastman of the North Carolina State University (NCSU) Center for Earth Observation provided the sections of the report pertaining to the production and positional AA of SARA photomosaics.

Stephanie Perles and Gregory Podniesinski (Pennsylvania Natural Heritage Program) provided NPS vegetation mapping project consultation, sample final reports, and metadata templates. In an effort to achieve consistency from state-to-state, sections of the text in this report were adapted with permission from previously completed NPS - National Vegetation Inventory Program (NVIP) reports (e.g., Perles et al. 2007).

The contributions of all contributing individuals are greatly appreciated.

List of Acronyms

AA	Accuracy Assessment
ac	Acre(s)
ASPRS	American Society of Photogrammetry and Remote Sensing
^{o}C	Degrees Celsius
CEGL	Community Element Code – Global
CES	Ecological System Code
cm	Centimeter(s)
CO_2	Carbon dioxide
dbh	Diameter at Breast Height
DOQQ	Digital Orthophoto Quarter Quadrangle
°F	Degrees Fahrenheit
e.g.	for example (*exempli gratia*)
ERDAS	Earth Resources Data Analysis System
ESRI	Environmental Systems Research Institute
et al.	and others (*et alia*)
FFDB	Field Form Database
FGDC	Federal Geographic Data Committee
FIPS	Federal Information Processing Standards
ft	Foot/Feet
GIS	Geographic Information System
GPS	Global Positioning System Receiver
ha	Hectare(s)
HHDB	Hand-Held Database
HTML	Hyper Text Markup Language
I&M	Inventory and Monitoring Program
in	Inch(es)
km	Kilometer(s)
m	Meter(s)
m^2	Square Meters
mi	Mile(s)
MMU	Minimum Mapping Unit
MrSID	Multiresolution Seamless Image Database
N/A	Not Applicable
NAD83	North American Datum of 1983
NBII	National Biological Information Infrastructure Program
NCSU	North Carolina State University
NETN	Northeast Temperate Inventory and Monitoring Network
NHS	National Historic Site(s)
NMS	Non-metric Multidimensional Scaling
NPS	National Park Service

NRC	Natural Resources Challenge
NVCS	National Vegetation Classification Standard
NVIP	National Vegetation Inventory Program
NY	New York
NYNHP	New York Natural Heritage Program
NYS	New York State
NYSC	New York State Classification
PC-ORD	Ordination Software
Ph.D.	Doctor of Philosophy
PNHP	Pennsylvania Natural Heritage Program
SARA	Saratoga National Historical Park
sp./spp.	Species (singular/plural)
STD	Standard
TIFF	Tagged Image File Format
TNC	The Nature Conservancy
TWINSPAN	Two-Way Indicator Species Analysis
U.S.	United States of America
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey
USNVC	U.S. National Vegetation Classification
UTM	Universal Transverse Mercator
WASO	Washington Area Service Office
XML	Extensible Markup Language

Introduction

The Director of the National Park Service (NPS) approved the Natural Resource Challenge (NRC) in 1999 to encourage national parks to focus on the preservation of the nation's natural heritage through science, natural resource inventories, and expanded resource monitoring (NPS 1999). The NRC provided funding for 12 baseline inventories to be completed in each of 270 parks with significant natural resources. Vegetation mapping is one of the 12 baseline inventories. Through the NRC, the 270 focus national parks were organized regionally into 32 Inventory and Monitoring (I&M) networks for the purpose of accomplishing natural resource inventory and monitoring projects.

The goal of the vegetation inventory project for SARA was to produce an up-to-date digital geospatial vegetation database and to provide a vascular plant species list, a dichotomous key for vegetation associations, and descriptions of the vegetation associations in the park. Baseline information on plant community structure and composition is critical to developing desired conditions and park management goals relating to native plant communities, non-native plant and insect species, and effects of other disturbances. The identification and description of plant communities also provide habitat information important to understanding associated organisms, including animals, protozoans, bacteria, and fungi. A map of vegetation associations may allow inferences about the location and abundance of species that are associated with each community.

NPS National Vegetation Inventory Program

The NPS National Vegetation Inventory (NVIP), one of the 12 basic natural resource inventories, was established in 1994 by the National Park Service and the U.S. Geological Survey (USGS) who worked in cooperation with The Nature Conservancy (TNC) and Environmental Systems Research Institute (ESRI) on initial protocol development. The NVIP was incorporated into the NPS I&M Program and is administered by the National Park Service at the national level (http://science.nature.nps.gov/im/inventory/veg/index.cfm). Its staff oversees funding and provides technical guidance and oversight for individual park projects, which are implemented by individual I&M networks and NPS parks. The objectives of the NVIP are to classify vegetation to ecological community types in each of more than 250 NPS parks in the United States outside of Alaska and to map vegetation in each park using the classification scheme developed for the park (Lea 2011). Vegetation plot data collected within or near the park using standard methods is the primary source for vegetation classification (TNC and ESRI 1994a, FGDC 2008).

Vegetation maps are produced from interpretation of remotely sensed imagery augmented by ground observations tagged with GIS points collected as Universal Transverse Mercator (UTM) coordinates defined by the North American Datum of 1983 (NAD 83). Maps have a scale of 1:24,000 and a minimum mapping unit of 0.5 hectares (ha), or 1.24 acres (ac). The vegetation maps must meet the FGDC National Map Accuracy Standards for positional accuracy which specify horizontal errors of less than 40.0 feet (ft), or 12.2 meters (m), on the ground for 1:24,000-scale maps. Additionally, a thematic accuracy assessment of a subset of polygons randomly selected from the completed map is conducted to estimate individual map class accuracy and overall map accuracy (Lea and Curtis

2010). Digital vegetation products are accompanied by FGDC-compliant metadata, which describe the content, quality, condition, and other characteristics of the spatial dataset and are critical elements that expedite the interpretation and exchange of information among users. All final NVIP products are made available at the NPS Data Store (https://irma.nps.gov/App/Portal/Home) and at the USGS Core Science Systems Program (http://www.usgs.gov/core_science_systems/csas/vip/products.html).

A complete NVIP project for a park includes, at a minimum, the following products:

- Detailed vegetation report
- Digital vegetation map
- Vegetation classification plot data
- Accuracy assessment data and analysis
- Dichotomous vegetation key
- Photo-interpretation key

U.S. National Vegetation Classification

Following the NPS protocols (Lea 2011), the classified vegetation types are named within the context of the U.S. National Vegetation Classification (USNVC) (FGDC 2008, NatureServe 2013, USNVC 2013) (Table 1), whenever adequately applicable taxonomic units have been named and described; vegetation units found in parks that appear to represent vegetation that is not described by the USNVC may be named and described for local project use within the format established by the National Vegetation Classification Standard (NVCS) (Lea 2011).

The USNVC represents the taxonomic content of the NVCS, which is a hierarchical system that allows vegetation classification at multiple scales and was adopted as an information sharing standard for vegetation by the Federal Geographic Data Committee (FGDC 1997). In 2008, the FGDC issued a new NVCS which established new hierarchy levels (Table 1) and new criteria for establishing taxonomic units within each level (FGDC 2008). The current USNVC content has been developed by a number of cooperators (FGDC 1997, FGDC 2008) and is maintained online by the USNVC consortium (USNVC 2013) at http://usnvc.org and by NatureServe (NatureServe 2013) at http://www.natureserve.org/explorer/.

The basic unit of vegetation classification in the USNVC is the association,a plant community type that is relatively homogeneous in composition and structure, and occurs in a uniform habitat. Each association is assigned a unique Community Element Global code (CEGL) by NatureServe. For example, the Eastern Hemlock - American Beech - Northern Red Oak Forest (CEGL006088) is a widespread association in southern New England that ranges south into localized parts of the northern Piedmont and High Allegheny Mountains. Associations recognized by the USNVC are

sometimes directly equivalent to communities in state-specific vegetation classifications such as Ecological Communities of New York State (Edinger et al. 2002) and can usually be crosswalked to the state classification.

Table 1. USNVC Hierarchy levels for natural and semi-natural vegetation, in descending taxonomic order (adapted from Federal Geographic Data Committee (2008)). (Description of individual units in each level can be found at http://usnvc.org) and at http://www.natureserve.org/explorer/.

USNVC LEVEL	DESCRIPTION OF CRITERIA FOR UNITS
Upper Levels: Physiognomic characters of vegetation play a predominant role.	
Level 1 – Class	Broad combinations of general dominant growth forms that are adapted to basic temperature (energy budget), moisture, and/or substrate or aquatic conditions.
Level 2 - Subclass	Combinations of general dominant and diagnostic growth forms that reflect global macroclimatic factors driven primarily by latitude and continental position, or that reflect overriding substrate or aquatic conditions.
Level 3 – Formation	Combinations of dominant and diagnostic growth forms that reflect global macroclimatic factors as modified by altitude, seasonality of precipitation, substrates, and hydrologic conditions.
Middle Levels: Both floristic and physiognomic characters of vegetation play a significant role	
Level 4 – Division	Combinations of dominant and diagnostic growth forms and a broad set of diagnostic plant taxa that reflect biogeographic differences in composition and continental differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
Level 5 – Macrogroup	Combinations of moderate sets of diagnostic plant species and diagnostic growth forms that reflect biogeographic differences in composition and subcontinental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes.
Level 6 – Group	Combinations of relatively narrow sets of diagnostic plant species (including dominants and co-dominants), broadly similar composition, and diagnostic growth forms that reflect biogeographic differences in composition and sub-continental to regional differences in mesoclimate, geology, substrates, hydrology, and disturbance regimes
Lower Levels: Floristic characters of vegetation play a predominant role.	
Level 7 – Alliance	Diagnostic species, including some from the dominant growth form or layer, and moderately similar composition that reflect regional to subregional climate substrates, hydrology, moisture/nutrient factors, and disturbance regimes.
Level 8 – Association	Diagnostic species, usually from multiple growth forms or layers, and more narrowly similar composition that reflect topo-edaphic climate, substrates, hydrology, and disturbance regimes.

The use of the standardized USNVC and the USGS-NPS vegetation mapping protocols facilitate effective resource stewardship and widespread collaboration by promoting compatibility of vegetation maps and associated products used to support a wide variety of resource assessment, park management, and planning needs. In addition, nationally compatable map products provide a common structure and language for framing and answering collaborative scientific questions about vegetation communities and their relationship to environmental conditions and ecological processes across landscapes.

New York Natural Heritage Program Relation to the USNVC

In 1990, the New York Natural Heritage Program (NYNHP) published Ecological communities of New York State, a classification of natural and human-influenced communities (Reschke 1990, NYNHP 2013). From 40,000-acre beech-maple mesic forests to 40-acre maritime beech forests, salt

marshes, and alpine meadows, the NYNHP classification has become the primary source for natural community classification in NY and is a fundamental reference for natural community classifications in the northeastern U.S. and southeastern Canada. This classification has been continually updated as new field data are available and has been incorporated into the USNVC (NatureServe 2013). Reschke (1990) has been incorporated into and updated by Ecological communities of New York State (Edinger et al. 2002). New York's ecological community data has been incorporated into the USNVC (NatureServe 2013).

Any vegetation classification is an attempt to define discrete entities in the face of continuous ecological gradients. Sometimes these entities (communities) exhibit a narrow range of variation from one example to the next; multiple occurrences of woodland vernal pool, as defined in the NY classification, are likely to be quite similar to each other in terms of their vegetation composition, environmental setting, and associated animal species. As described above, communities defined at the association level in the USNVC are also defined by a specific suite of species occurring in a uniform habitat. For NY ecological communities like the vernal pool, a one-to-one link (crosswalk) between NY's classification and the USNVC is often possible (e.g., vernal pool is equivalent to USNVC type Eastern Woodland Vernal Pool, CEGL006453). Other NY community types, such as shrub swamp, are more broadly defined and encompass examples with significantly different dominant species and environmental features. This results in a one-to-many crosswalk with the USNVC, linking shrub swamp with multiple NVC types dominated by different characteristic species.

The New York Natural Heritage Program is an active participant in NatureServe's international network of natural heritage programs and biodiversity data centres. There are currently natural heritage programs in all 50 states and several interstate regions; there are 21 conservation data centres, the international equivalent of natural heritage programs, in Canada, Latin America, and South America. These programs work with NatureServe to develop biodiversity data, maintain compatible standards for data management, and provide information about rare species and natural communities that is consistent across many geographic scales from sites to continents. The collaboration between NatureServe, states, and nations places local information into a broader regional context. With NatureServe, the NYNHP tracks the rarity of species and natural communities at global and state scales, informing conservation planning by distinguishing between species with only a few populations globally (globally rare and state rare) and those that have only a few populations in NY but are otherwise common (globally common and state rare).

NPS Northeast Temperate Network

The Northeast Temperate Network (NETN) (Figure 1) is headquartered in Woodstock, Vermont and encompasses 13 park units managed by the NPS: Acadia National Park (ACAD), Appalachian National Scenic Trail (APPA; Maine to Maryland), Boston Harbor Islands National Recreation Area (BOHA), Eleanor Roosevelt National Historic Site, Home of Franklin D. Roosevelt National Historic Site, Marsh-Billings-Rockefeller National Historical Park (MABI), Minuteman National Historic Park (MIMA), Morristown National Historic Park (MORR), Saint-Gaudens National Historic Site

(SAGA), Saratoga National Historical Park (SARA), Saugus Iron Works (SAIR), Vanderbilt Mansion National Historic Site (VAMA), and Weir Farm National Historic Site (WEFA) (USDI NPS NETN 2013). VAMA, HOFR, and ELRO are collectively managed and known as Roosevelt-



Figure 1. Map of Northeast Temperate Network Park Units [Source: USDI NPS NETN 2013].

Vanderbilt National Historic Sites (ROVA). Together, the 13 park units comprise nearly 57,933 ha (143,156 ac) and range considerably in size (3 to 34,398 ha, or 9 to 85,000 ac) and topographic relief.

NETN parks are located within the temperate deciduous forest biome; characteristic trees are broadleaf/deciduous including species of oak, maple, beech, hickory, and chestnut. Deciduous forest regions are exposed to warm and cold air masses, which cause this area to have four distinct seasons. Temperature varies widely from season to season with cold winters and hot, wet summers. The areas in which deciduous forests are located receive from 75 to 150 cm (29.5 to 59.1 inches) of precipitation occurring evenly throughout the year. The diversity of ecological communities found within NETN park units range from tidal wetlands and other coastal communities to freshwater wetlands and vernal pools as well as deciduous, mixed, and hemlock forests.

Project Area

Park-Specific Information

Saratoga National Historical Park was established in 1938 to commemorate the 1777 battles of Saratoga, considered by historians to be the turning point of the American Revolutionary War. The park is approximately 1376 ha (3400 ac) in size and preserves and interprets four separate parcels associated with this military campaign, the: (1) Battlefield (Stillwater, NY); (2) Schuyler House (Schuylerville, NY); (3) Saratoga Monument (Schuylerville, NY); and (4) Victory Woods (Village of Victory, NY). Visitors participate in hiking, cycling, nature viewing, and learning about the Battle of Saratoga (http://www.nps.gov/sara/parkmgmt/statistics.htm).

SARA is located along the western bank of the Hudson River and is characterized by grassy hills and forested ravines along tributary streams that provide abundant habitat for wildlife, particularly bird species. Herbaceous vegetation of hills and fields within SARA is actively managed as an important grassland bird breeding area (Trocki and Paton 2005), resulting in the designation as an "Important Bird Area" by Audubon New York (Burger and Liner 2005).

An overview of the land use history, physiography and geology, stream drainage, and climate of the park is presented in the Soil Survey of Saratoga County, New York (USDA NRCS 2004a). General information describing the cultural and natural history of SARA is presented in NPS park brochures as well as NPS official websites (e.g., http://www.nps.gov/sara/).

SARA occurs in the eastern portion of Saratoga County, NY (Figure 2). The park covers portions of four 1:24,000 USGS topographic quadrangle maps (Figure 3) and is comprised of two units. The majority of SARA is comprised of the Battlefield Unit, a large contiguous parcel in the town of Stillwater. The Battlefield Unit is located on four USGS 7.5 minute topographic quadrangle maps, they are: Quaker Springs, Schuylerville, Mechanicville, and Schaghticoke (Figure 3).

The Old Saratoga Unit is comprised of three separate parcels located approximately 11.3 km (7 mi) north of the Battlefield Unit in the villages of Schuylerville and Victory (Figure 2). The Old Saratoga Unit includes the Schuyler House, the Saratoga Monument, and Victory Woods. The Schuyler House is the restored home of American General Philip Schuyler located near the confluence of Fish Creek and the Hudson River in Schuylerville. The Saratoga Monument is a 47.3 m (155 ft) tall obelisk commemorating the American victory in the Battle of Saratoga on Burgoyne Street in Schuylerville. Victory Woods, an 8 ha (22 ac) woodland used by British soldiers as their last defensive position before surrendering in October, 1777, is located along Route 32 in the village of Victory. The Old Saratoga Unit is located on the Schuylerville USGS 7.5 minute topographic quadrangle map (Figure 3).

Park Environmental Attributes

Ecoregions

The distribution of plant and animal species in New York closely corresponds with ecoregional boundaries. These areas of ecological homogeneity are defined by similarities in soil, physiography,

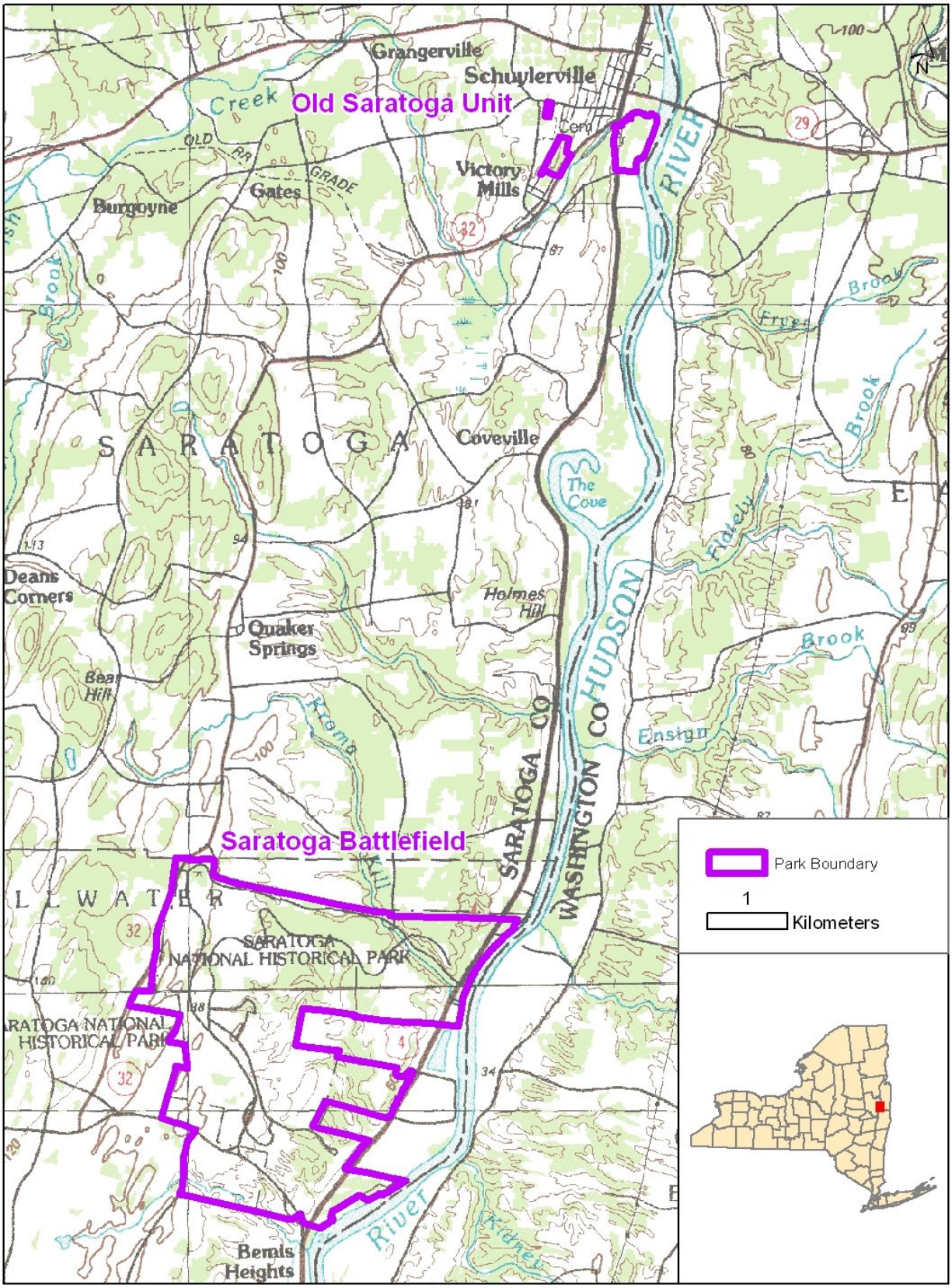


Figure 2. Location of Saratoga National Historical Park in Saratoga County, New York.

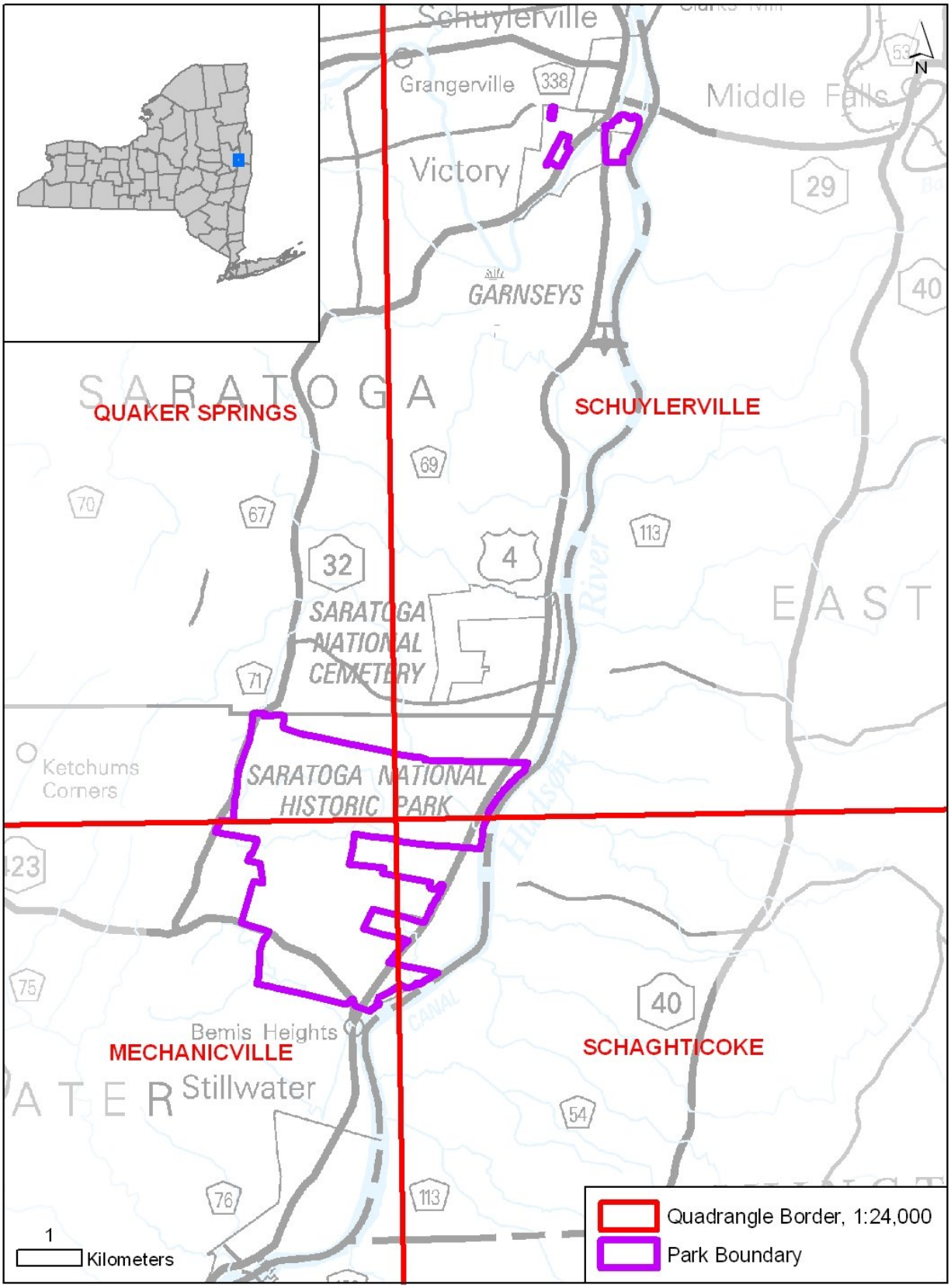


Figure 3. Location of Saratoga National Historical Park on 1:24,000 USGS topographic maps.

climate, hydrology, geology, and vegetation. The ecoregions are based on The Nature Conservancy (TNC) classifications for the U.S. and are modified from USDA Forest Service ecoregions (Bailey 1995). There are seven TNC Ecoregions and 34 Ecoregion Subsections in New York. SARA is within the Hudson Glacial Lake Plains Subsection of the Lower New England/Northern Piedmont Ecoregion (Figure 4).

Geology

The Battlefield Unit, which comprises the majority of the park, lies on rolling hills rising from the alluvial floodplain along the Hudson River (Stalter et al. 1993). Elevations of the Battlefield Unit range from 85 ft (26 m) above sea level along the river to 407 ft (124 m) atop Fraser Hill. Numerous glacial ridges and ravines drain east into the Hudson River, however a relatively low but steep escarpment marks the boundary between the hills and the alluvial floodplain of the Hudson River (Stalter et al. 1993).

The underlying bedrock of the Battlefield Unit occurs in three wide bands that run roughly parallel to the Hudson River (Figure 5). All local bedrock is Ordovician to Cambrian age sedimentary rock, including sandstone, siltstone, and shale. The first band adjacent to the river is Canojoharie Shale (sandstone and shale) which comprises about half of the Battlefield Unit bedrock. The second band above the river is the Mount Merino Formation which is comprised of shale and siltstone with minor amounts of sandstone. The third band, which is restricted to the western-most edge of the Battlefield Unit, is in the Austin Glen Formation and is comprised of shale, siltstone, and minor amounts of sandstone. Bedrock underlying the Old Saratoga Unit is the Mount Merino Formation (Fisher et al. 1970, Figure 5). Similar to the bedrock, the surficial geology of the Battlefield Unit parallels the river (Figure 6). A band of recent alluvium (sand/gravel) adjacent to the river and associated with the floodplain grades into lacustrine silt and clay on the level hilltops to the west. To the north, the park unit is underlain with lacustrine quartz sand and to the west it grades into glacial till (silt-to-boulders in size). The surficial geology of the Old Saratoga Unit is similar to the Battlefield Unit and is primarily recent alluvium along the river near the Schuyler House, grading into glacial till to the west. Victory Woods is underlain with recent alluvium and lacustrine silt and clay (Cadwell and Dineen 1987, Figure 6).

More detailed information describing the geology of SARA is presented in the Soil Survey of Saratoga County (USDA NRCS 2004a), SARA Water Resources Management Plan (Vana-Miller et al. 2001), and Vascular Flora of Saratoga National Historical Park, New York (Stalter et al. 1993).

Topography

Heath et al. (1963) described the SARA vicinity as two topographically distinct areas. West of Route 32, low hills elongate in a northeast-southwest direction, alternating with broad, relatively flat-bottomed valleys. Hill elevations range from about 400 ft (123 m) above sea level in the northwestern corner of SARA to more than 600 ft (183 m) above sea level a few miles west of SARA. The valley basins generally range from about 300 ft (91 m) above sea level near Route 32 to 450 ft (137 m) above sea level a few miles west of SARA (Vana-Miller et al. 2001). Additional information describing the SARA physiography and relief features is presented in the Soil Survey of

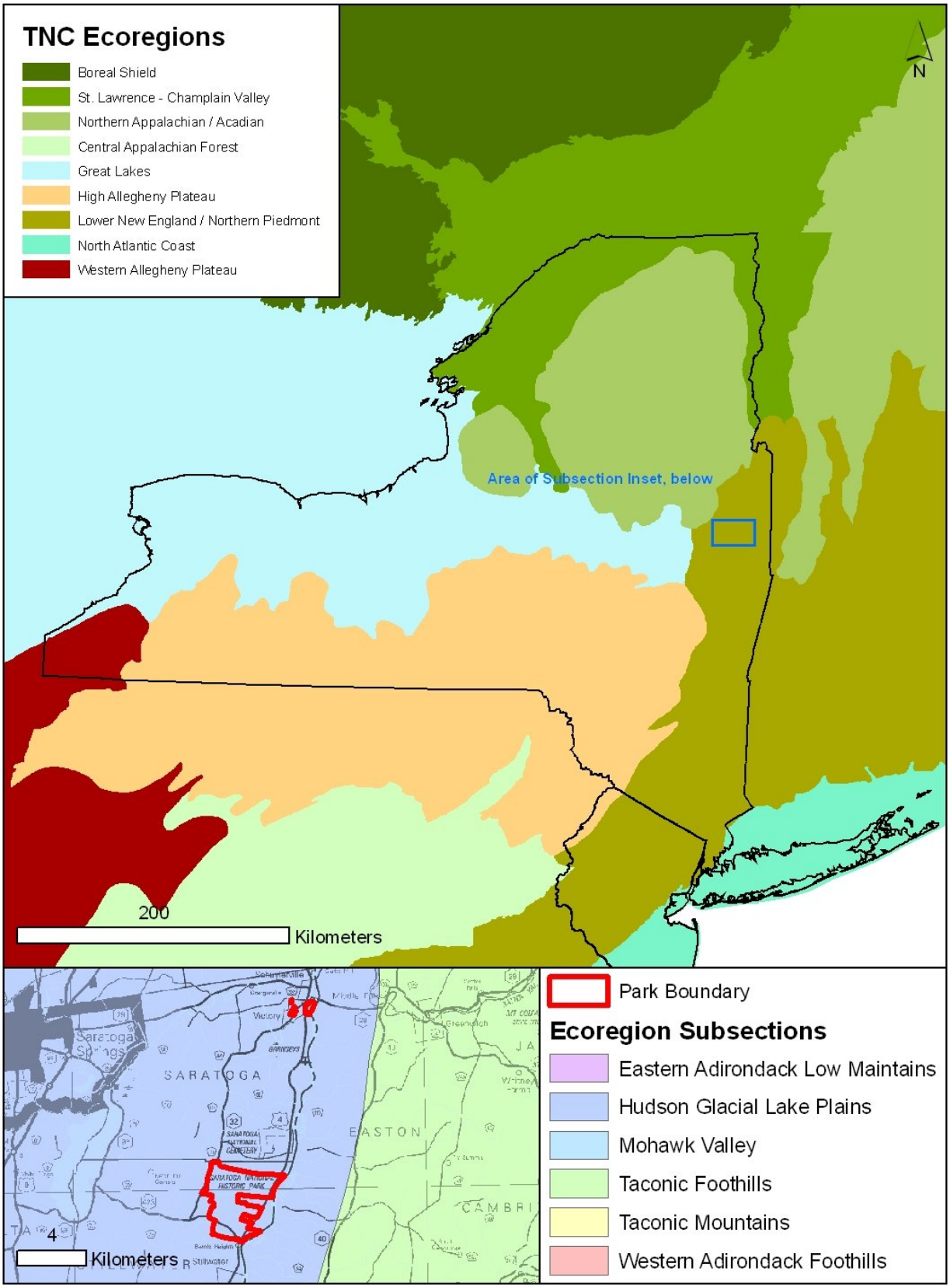


Figure 4. Ecoregion Sections and Subsections (Bailey 1995) of Saratoga National Historical Park.

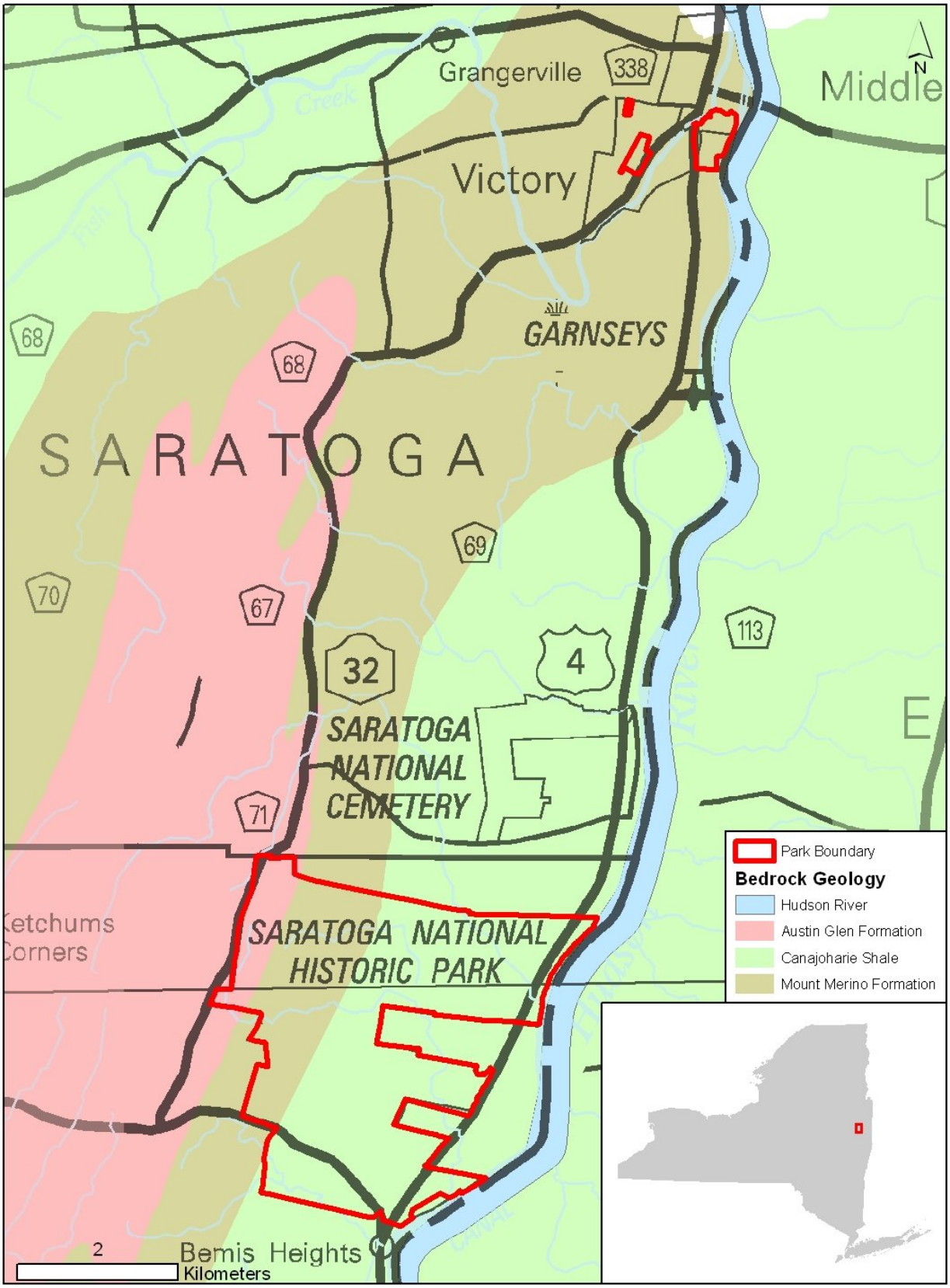


Figure 5. Bedrock geology (Fisher et al. 1970) of Saratoga National Historical Park.

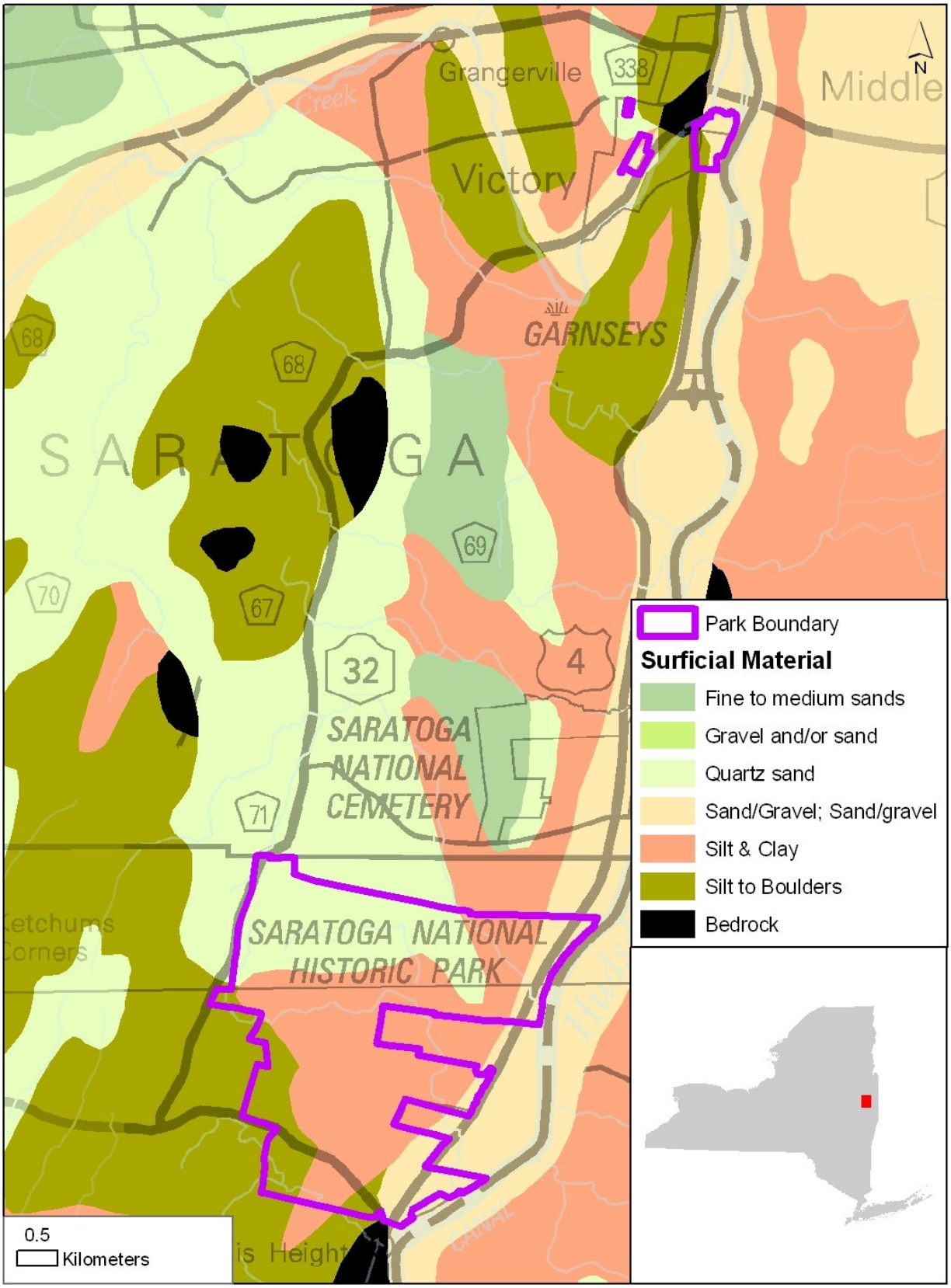


Figure 6. Surficial geology (Caldwell and Dineen 1987) of Saratoga National Historical Park.

Saratoga County (USDA NRCS 2004a) and the SARA Water Resources Management Plan (Vana-Miller et al. 2001).

Soils

Detailed classifications, descriptions, and maps of the soil types within SARA are presented in the Soil Survey of Saratoga County, New York (USDA NRCS 2004a). Along the Hudson River, alluvial clay and loam soils are often wet and swampy. The hills adjacent to the river flats are sand- and gravel-topped with a variety of soil types. Between 2000 and 2400 ft (610 and 732 m) west of the escarpment, the sandy matrix of the soil changes to clay loam with the higher ridges topped by gravel, shale outcrops, bedrock, and occasional boulders.

Most sandy soils near the Hudson River are underlain by clay, therefore deep drainage is slow. The drainage in clay loam soils is also slow, resulting in surface water that forms ponds and marshes.

The soil types formed and classified in the region around SARA are heavily influenced by the retreating glaciers that left substantial amounts of meltwater (USDA NRCS 2004a). Meltwater created large temporary lakes in the lowland areas between the ice front and topographic highlands by plugging meltwater channels with vast amounts of glacial debris. These lakes served as receiving basins for large quantities of sediment that were transported by the meltwater streams. Surficial deposits in the eastern portion of Saratoga County reflect material deposited from large glacial lakes. Stratified deposits of fine-to-coarse sand and gravel occupy a large part of Saratoga County. This sand deposit is part of the Glacial Lake Albany Sand Plain which is marked by ice contact features including deltas, kames (irregularly shaped hills/mounds that accumulate in a depression on a retreating glacier then deposited on the land surface with further melting of the glacier), outwash sands, and lacustrine sands that were deposited by streams entering the lake. These sands, underlain by glacial till or lying directly on bedrock, are the most productive source of groundwater in the county. The Oakville soil type is an example of soils mapped within SARA that formed in these deposits.

Parts of SARA contain soils that are composed of lacustrine deposits of clay and silt that were laid down in the deeper water areas of Lake Albany (USDA NRCS 2004a). In most of these areas the sediments lie directly on glacial till or bedrock and are a poor source of usable groundwater. The Hudson and Rhinebeck soil types are examples mapped within SARA that are formed in these lacustrine deposits.

The following twelve major soil associations have been identified and mapped within SARA (USDA NRCS 2004a):

- Rhinebeck Silt Loam, 0-to-15 percent slopes
- Hudson silt loam, hilly
- Bernardston-Manlius-Nassau complex, undulating
- Manlius-Nassau complex, hilly, rocky

- Oakville loamy fine sand, nearly level
- Bernardston silt loam, 3-to-8 percent slope
- Pittstown silt loam, 3-to-8 percent slope
- Limerick-Saco complex
- Madalin mucky silty clay loam
- Nassau-Rock outcrop complex
- Sun silt loam
- Mosherville-Hornell complex, undulating

Hydrology

Detailed information describing the hydrology and stream drainage within/through SARA is presented in the Soil Survey of Saratoga County (USDA NRCS 2004a) and the SARA Water Resources Management Plan (WRMP) (Vana-Miller et al. 2001), which was developed to complement existing SARA management plans.

In summary, SARA includes and contributes surface and groundwater drainage to several tributaries of the Hudson River (American Creek, Devil's Hollow, Kroma Kill, and Mill Creek). The Kroma Kill occupies the largest drainage within SARA; it is a 3rd order stream. Devil's Hollow flows through a small hemlock-dominated ravine, it then cascades over shale bedrock. In the late 1980s these streams were monitored and the water quality was determined to be generally good (Vana-Miller et al. 2001).

The SARA WRMP (Vana-Miller et al. 2001) discusses the following water-related resource issues: (1) abandoned wells; (2) beaver colonization; (3) canal flooding of Route 4; (4) dump site water quality; (5) status of potable water supply; (6) water quality monitoring program development; and (7) zebra mussel colonization. Also presented within the SARA WRMP (Vana-Miller et al. 2001) are management recommendations and one water-related project statement to address some of the hydrology-related issues. The vegetation association map produced under this project fulfills the following SARA WRMP recommendation: "Conduct a GIS-based boundary layer study with the following layers: (1) a base map showing current land use, infrastructure, ownership, and zoning; (2) a theme showing unique ecosystem components that extend beyond boundaries…".

Methods

Planning and Scoping

Several steps were taken to prepare for the vegetation classification and mapping project within SARA and its environs. On January 23, 2003, NYNHP ecologist Greg Edinger met with NPS staff Chris Martin and Joe Finan at the Battlefield Unit. The project timeline, mapping product specifications, access issues, natural resource management needs, available applicable GIS layers, and applicable previous and current research conducted within SARA were discussed.

Preliminary Data Collection and Review of Existing Information

Previous studies conducted within SARA were obtained from the natural resource manager and NYNHP files and reviewed for information pertinent to the extant vegetation (e.g., Trocki and Paton 2005 and Vana-Miller et al. 2001). Three reports included previous vegetation classifications, floristic surveys, and wetland studies (Canham 2004, Stalter et al. 1993, and Tiner et al. 2000). General information on the cultural and natural history of SARA was obtained from various books, reports, and NPS park brochures, as well as NPS official websites (e.g., http://www.nps.gov/sara/). In addition, shapefiles containing digital information on agriculturally-leased property, field burn history, mowing history, and park boundaries were obtained from SARA staff.

The following data layers were available to NYNHP via New York State Department of Environmental Conservation (NYS DEC) in digital and hard copy formats and were reviewed to refine photo interpretation: (1) soil maps (USDA NRDC 2004a, STATSGO - NY State Soil Survey Geographic Database); (2) bedrock and surficial geology maps (Cadwell and Dineen 1987, Fisher et al. 1970, and NYS Museum digital geology data); (3) wetland maps (National Wetlands Inventory Data for NY State, NY State Regulatory Freshwater Wetland data); and (4) the NYNHP Biotics database.

Preliminary Vegetation Map Production

Digital orthorectified photomosaics of SARA, contracted out by NPS (see following sections), were not completed in time to digitize the preliminary vegetation map prior to the 2003 field season. In order to complete the field work, the preliminary vegetation map was developed by using stereo pairs of 1995 color infrared National Aerial Photography Program (NAPP; https://lta.cr.usgs.gov/NAPP) aerial photos to inform the on-screen digitizing of NY ecological community (Edinger et al. 2002) boundaries using 1994-99 digital orthophoto quarter quadrangles (DOQQs; USGS 1994) as the base layer. The first set of deliverables for this project, including the preliminary community delineations on digital imagery for SARA draft classification, were completed and provided to NPS on May 16, 2003 for review.

The NY ecological community types (Edinger et al. 2002) on the preliminary vegetation map were delineated based on vegetation structure, leaf phenology, and hydrologic regime because these characteristics can be easily identified on aerial photography. This map was developed as a guide for vegetation classification plot sampling efforts.

Photo Interpretation

The preliminary vegetation map and subsequent revised maps were created through aerial photography interpretation which is the act of examining aerial photographs in order to identify objects; in this case vegetation and land use types (Avery 1978). The 1995 hard copy NAPP photographs (color infrared, stereo pair, hard copy) were examined through a stereoscope, which provides the interpreter with a three-dimensional view. The 1994-99 DOQQs were examined on-screen in ArcView 3.2 (ESRI 1992-2000). In addition, digital topographic quadrangle maps were examined in ArcView 3.2. Using information gathered from aerial photographs, the DOQQs, and the topographic maps, polygons representing different ecological communities were digitized on-screen using ArcView 3.2. The on-screen digitization process permitted the simultaneous use of aerial photography and supplemental digital data layers that are useful in delineating USNVC association boundaries, including USGS quadrangle maps, Department of Transportation road coverages, hydrology coverages, and NPS boundaries.

Aerial Photography Acquisition and Processing

Two sets of digital orthophotography were used in the vegetation/land use mapping process after the 2003 field season: (1) a digital orthophoto mosaic that is referred to as the Battlefield Unit photomosaic and (2) digital orthophotography of the Schuyler House, Saratoga Monument, and Victory Woods areas, located approximately seven mi (11.3 km) north of the Battlefield Unit, referred to as the Old Saratoga Unit orthophotography.

Battlefield Unit Photomosaic

On April 28, 2003, William Frament, USDA Forest Service (Northeastern Area State and Private Forestry, Durham, NH) acquired leaf-off, stereo pair 1:8,000 scale (1 in = 667 ft) color infrared aerial photography for a digital orthorectified photomosaic of the Battlefield Unit. Frament scanned the aerial photographs at 600 dpi and delivered the scanned image files (in TIFF format) and the hard copy photographs to North Carolina State University (NCSU). The photographs, camera calibration certificate, and a shapefile of photo-centers provided by Frament are stored in the archive that NCSU maintains for the NETN.

The Battlefield Unit photomosaic was produced from 23 color infrared aerial photographs. Scanned .tif images of the aerial photographs were imported into ERDAS IMAGINE (Leica Geosystems Geospatial Imaging 2003) Version 8.7 .img format where a photo block was created using a USGS digital elevation model and DOQQs as reference. In preparation for this step, the digital elevation model was resampled from 30 meters to 10 meters and the DOQQs were mosaicked. The photo block was manipulated until it could be triangulated with a root mean square error of less than 1. Single frame orthophotos (one for each aerial photograph) were then generated within IMAGINE and exported to .lan format. The .lan files were imported into ER Mapper's (Earth Resource Mapping Ltd. 2003) Version 6.4 native (.ers) format and ER Mapper was used to define cutlines, color balance and mosaic the images, generate band interleaved by line (.bil) image and header files for the photomosaic, and convert the .bil image to IMAGINE .img format. The .img image was compressed using MrSID (LizardTech, Inc. 2000) Version 1.4 software with a 20:1 compression ratio. The final photomosaic, in both .img and MrSID formats, is stored in the NCSU archive.

Metadata for the Battlefield Unit photomosaic was prepared in accordance with the current FGDC standards (FGDC 1998a). Metadata were produced in notepad and parsed using the USGS metadata compiler (USGS 2004). After all errors and omissions identified by the parser were corrected, the metadata compiler was used to generate final TXT, HTML, and XML versions of the metadata record which are stored in the NCSU archive. Key information for this photomosaic is summarized in Table A-1 in Appendix A.

Old Saratoga Unit Orthophotography

Chas. H. Sells, Inc. acquired true-color aerial photography (1:12,000-scale; 1 in = 1,000 ft) of the Schuyler House, Saratoga Monument, and Victory Woods units on May 3, 2000. The aerial negatives were scanned at 25 microns (1,016 DPI) and the images were rectified on a KLT/DSP softcopy photogrammetric imaging system. The rectification process involved registering the image to a digital elevation model. The final rectified images have a pixel resolution of 0.30 meters. Key information for the SARA - Old Saratoga Unit orthophotography is summarized in Table A-2 in Appendix A.

Field Data Collection for Vegetation Classification

All vegetation classification plot sampling followed the NVIP and NYNHP protocols (TNC and ESRI 1994b, Edinger et al. 2000). To determine the number of classification plots to sample, the 2003 preliminary vegetation map was used as a guide and the number of vegetation cover types, land use types, and polygons per cover/land use type were examined. The USGS/NPS Vegetation Mapping Protocol suggests that each vegetation association should be sampled at least three times in order to capture the naturally occurring variation within a park (TNC and ESRI 1994b). Therefore, at least three polygons of each vegetation cover type, with each polygon representing a vegetation stand of that cover type, were selected for sampling. For vegetation cover types with less than three polygons, each polygon was selected for sampling. For vegetation cover types with numerous polygons or for types that covered large areas, polygons were selected that represented different aerial photograph signatures and environmental settings in order to capture the natural range of variability of the vegetation. Polygons that represented cultural types labeled with Anderson Level I and II categories (Anderson et al. 1976) were not intentionally sampled, although some plots were later determined to fall into cultural types.

Field Survey

Within each stand of vegetation that was represented by the polygon selected for sampling, a classification plot was established in an area that most represented the existing vegetation community (Mueller-Dombois and Ellenberg 1974). All vegetation data were collected following the NPS and NYNHP sampling protocols (TNC and ESRI 1994b, Edinger et al. 2000), with 20 m × 20 m plots in forests and woodlands and 10 m × 10 m plots in shrublands and herbaceous vegetation. The vegetation was visually divided into eight strata: emergent trees (variable height), tree canopy (variable height), tree subcanopy (>5 m), tall shrub (2–5 m), short shrub (<2 m), herbaceous, non-vascular, and vines. The percent cover was estimated for each species in each stratum. Specimens of species that were not identifiable in the field were collected for later identification. The diameter at

breast height (dbh) (4.3 ft = 1.3 m) was measured with a dbh tape for all trees larger than 4 in (10 cm) in diameter that were rooted in the plot. The dbh was recorded by species and strata.

In addition to floristic information, the following environmental variables were recorded at each plot: slope, aspect, topographic position, hydrologic regime, soil stoniness, average soil texture, and soil drainage. Any unvegetated area of the classification plot was characterized by the exposed substrate. Notes were taken on the classification plot's representativeness to the surrounding vegetation and any other significant environmental information, including landscape context, herbivory, stand health, recent disturbance, or evidence of historic disturbance. Reference observation point data were also collected to inform photo-interpreters and classification ecologists about the distribution, image signature, and range of variability of vegetation associations. Reference observation points typically represented an area approximating the minimum mapping unit and provided dominant and characteristic plant species and environmental information.

Classification plot data and reference observation point data were collected digitally in the field using an iPAQ hand-held computer with software (Hand-Held Database - HHDB) and imported to the Field Form Database (FFDB) developed by NYNHP. A sample plot form and screen shots from the HHDB used for this project are included in Appendix B. All field data for quantitative vegetation samples were then converted to the PLOTS Database version 2.0 (NatureServe 2004) and are provided as a supplement to this report. Nomenclature follows the PLANTS 3.5 Database developed by the NRCS in cooperation with the Biota of North America Program (USDA NRCS 2004b, 2013).

A digital photograph was acquired at most of the classification plot sampling locations. The location of each classification plot was recorded with a Magellan SporTrak GPS receiver. The GPS receiver was set to Universal Transverse Mercator (UTM) Zone 18, North American Datum (NAD) 1983, meters.

Classification plot sampling was conducted from June 11 to September 25, 2003 and from July 20 to September 22, 2004; vernal pools were surveyed April 15 and 19, 2005. Classification plot sampling was conducted by Greg Edinger (NYNHP) and Carly Voight (NYNHP). In total, 185 plots (181 vegetation classification plots plus four vernal pool plots) and 20 reference observation points were sampled throughout SARA from 2003 through 2005 (Figures 7 and 8).

Vegetation Classification and Characterization

Data from the 181 vegetation classification plots in the NYNHP FFDB were edited for accuracy and exported into an Excel spreadsheet format compatible with PC-ORD version 4.0 Multivariate Analysis software (McCune and Mefford 1999). Data from the four vernal pool classification plots were not included in the statistical analyses, because they were sampled one year after statistical analyses were completed. The FFDB export program automatically assigns standardized codes based on the PLANTS 3.5 Database developed by the NRCS in cooperation with the Biota of North America Program (USDA NRCS 2013). The common and scientific names of plants observed during the vegetation classification plot sampling are listed alphabetically by Family in Appendix D. Some tree and shrub seedlings and immature herbaceous plants could only be identified to genus and are so-listed in the appendix.

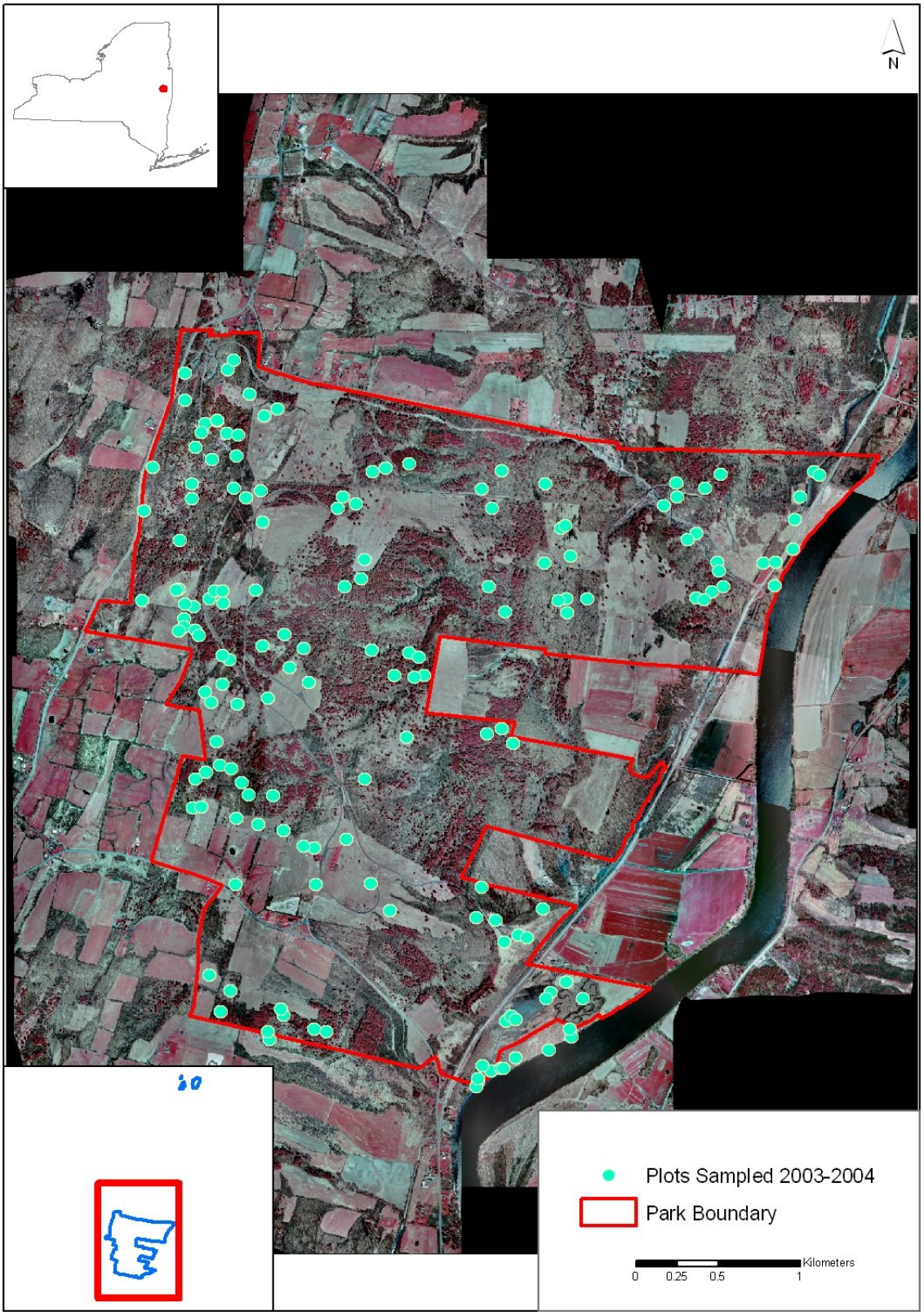


Figure 7. Location of 2003-2004 vegetation classification plots (155) within the Battlefield Unit of Saratoga National Historical Park.

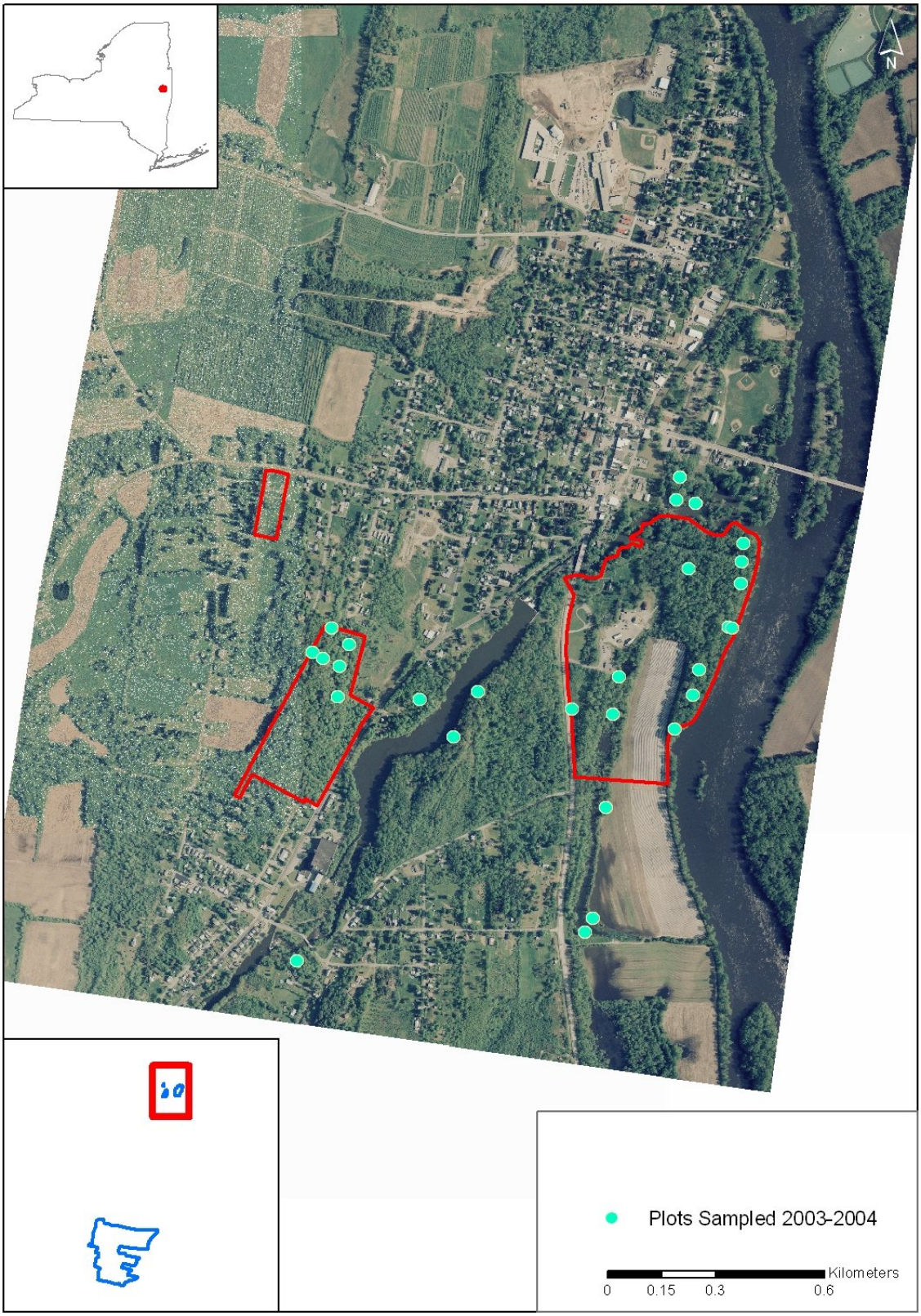


Figure 8. Location of 2003-2004 vegetation classification plots (30) within the Old Saratoga Unit of Saratoga National Historical Park.

SARA vegetation associations were classified using PC-ORD version 4.0 Multivariate Analysis package (McCune and Mefford 1999). Classification plot data were exported from the NYNHP Field Form Database (FFDB) and transferred into a Microsoft Excel spreadsheet for creating data matrices preparation prior to PC-ORD analyses. The following six matrices were created for SARA:

1. all plots, with species separated by strata
2. all plots, with species separated by strata and exotic species removed from analysis
3. all plots; species lumped (i.e., not separated) across strata
4. all plots; species lumped across strata and exotic species removed from analysis
5. forest plots; species lumped across strata and exotic species removed from analysis
6. upland forest plots; species lumped across strata and exotic species removed from analysis

The following three analyses with indicated settings were run from the PC-ORD software package for all six matrices, as described above (18 total analyses, Table 2):

1. NMS: Non-metric Multidimensional Scaling (Kruskal and Wish 1978, Clarke 1993), Autopilot mode, Medium Speed vs. Thoroughness, and Sorensen (Bray-Curtis) distance measure.

2. CA: Hierarchical Cluster Analysis, Relative Euclidian linkage method, and Ward's Method distance measure.

3. TWINSPAN: Two-Way Indicator Species Analysis (Hill and Gauch 1979) with default settings.

Table 2. Plots vs. species matrices for vegetation classification of Saratoga National Historical Park[a]

	1. All plots/ Separate strata	**2. All plots/ Separate strata/ No exotics**	**3. All plots/ Lumped strata**	**4. All plots/ Lumped strata/ No exotics**	**5. Forest plots/ Lumped strata/ No exotics**	**6. Upland Forest/ Lumped strata/ No exotics**
NMS/ Autopilot/ Medium	181[b] x 385	178 x 319	181 x 303	178 x 244	81 x 177	47 x 111
Cluster An/ Rel. Euc./ Wards Meth	181[b] x 385	178 x 319	181 x 303	178 x 244	81 x 177	47 x 111
TWINSPAN (default settings)	181[b] x 385	178 x 319	181 x 303	178 x 244	81 x 177	47 x 111

[a] Or, pseudospecies (species-strata) in cases of separate strata.

[b] Only 181 of the 185 plots sampled were included. Four vernal pool plots (VP01, VP02, VP03, VP04) were sampled one year after data analyses were run and not included in these datasets.

Due to the large size of the dataset, it is impractical to include graphical representations of these analyses in this report. The results of the classification analyses were evaluated against each other and compared to Ecological Communities of New York State (Edinger et al. 2002) and the USNVC.

For a detailed discussion of the statistical techniques used in this study, please refer to McCune and Grace (2002). Based on this evaluation, a revised list of preliminary vegetation associations was identified and in spring 2006 a revised preliminary vegetation map was created.

Each preliminary vegetation association was assigned a common name based on the Ecological Communities of New York State (Edinger et al. 2002). If no appropriate name existed in Edinger et al. (2002), the USNVC common name was used, or a park-specific common name was created in the case of successional and cultural vegetation types not easily handled by Edinger et al. (2002) or the USNVC.

After local, park-specific, descriptions were developed for the preliminary vegetation associations (based on the above-described analyses) they were crosswalked to the USNVC. Based on the multivariate analyses, the preliminary park-specific local vegetation associations were qualitatively compared to existing associations in the USNVC by searching for alliances sharing similar dominant species, as well as physiognomy and environmental setting. Total floristic composition was used to determine the appropriate association within the alliance. Global information on the associations from the USNVC was then appended to the local descriptions to provide resource managers with a broader context for the vegetation that has become established in SARA. During spring 2006, NatureServe assisted with labeling classification plots with correct USNVC association codes.

A park-specific dichotomous key to the USNVC associations was created (Appendix E) to accompany the classification and vegetation associations descriptions (Appendix F) and for use by park natural resource managers, research ecologists, interpretive staff, and others. A dichotomous key is a tool for identifying unknown entities, in this case, vegetation associations. The key to the associations begins with a "key to the keys" that directs the user to one of the five major groups of associations: (1) Upland Woody Vegetation; (2) Wetland Forests; (3) Wet Shrublands; (4) Open Uplands; and (5) Herbaceous Wetlands. The keys are structured by a series of couplets, two statements that describe different, mutually exclusive characteristics of the associations. Choosing the statement that best fits the association under evaluation leads the user to the correct association. The dichotomous key should be used in conjunction with the detailed vegetation association descriptions and characteristic field photographs to confirm that the association selected with the key is appropriate.

2006 Revised Preliminary Vegetation Map (pre-accuracy assessment)

Following the vegetation plot data analysis, the preliminary vegetation map was edited and refined to produce a revised preliminary vegetation map prior to thematic accuracy assessment (AA). Using ArcMap 9.2 (ESRI 1999-2006), polygon boundaries were revised on-screen using the newly acquired aerial orthophotography (digital photomosaic) based on the classification plot data, field observations, classification analyses, aerial photography signatures, and topographic maps. Each polygon was assigned the USNVC Community Element Global (CEGL) code of a preliminary vegetation association based on the information sources listed above. Second, third, and fourth CEGL code choices were entered in cases of uncertainty, or for polygons representing mosaics of two or more vegetation types.

Accuracy Assessment

Two sources of potential error in the vegetation map include: (1) horizontal positional accuracy, in which a location on the photomosaic does not accurately align with the same location on the ground due to errors in orthorectification or triangulation and (2) thematic accuracy, in which the vegetation type assigned to a particular location on the map does not correctly represent the vegetation at the same location within SARA due to mapping error. The NVIP (ESRI et al. 1994) were followed to assess the positional accuracy of the digital photomosaic and the thematic accuracy of the 2006 revised preliminary vegetation map.

Positional Accuracy Assessment (AA) of the Battlefield Unit Photomosaic

Horizontal positional error, in which a location on the photomosaic does not accurately align with the same location on the ground due to errors in orthorectification or triangulation, is one potential source of map error. The horizontal positional accuracy of the Battlefield Unit photomosaic was assessed using guidelines of the NVIP (ESRI et al. 1994). Well-defined positional accuracy ground control points were placed throughout all quadrants of the photomosaic in ArcView. Ground control points and zoomed-in (enlarged) screenshots of each point were plotted on hard copy maps with the photomosaic as a background. These maps and plots were used to locate the ground control points in the field. Field staff recorded the ground control point coordinates with a Trimble Pro XRS global positioning system (GPS) receiver with real-time differential correction. Mapped ground control points that were physically inaccessible were also noted. The field crew collected AA data at 43 ground control points. Prior to calculating accuracy, five ground control points were identified as outliers with the SAS JMP program and removed. The field-collected GPS coordinates for the remaining 38 points were compared to the coordinates obtained from the photomosaic viewed in ArcView. Both pairs of coordinates for each point were entered into a spreadsheet in order to calculate horizontal accuracy (in meters). The accuracy calculation formula is based on root mean square error (FGDC 1998b, Minnesota Governor's Council on Geographic Information and Minnesota Land Management Information Center 1999). Figure 9 shows the distribution of the ground control points within the SARA Battlefield Unit and surrounding area.

Positional Accuracy Assessment (AA) of the Old Saratoga Unit Orthophotography

According to the metadata for the orthophotography, 25 photo-control points were collected by conventional GPS survey methods throughout the project area which included the Battlefield, Schuyler House, and Saratoga Monument units. These photo-control points were used to insure accuracy during the aerial triangulation process. Photo-control points have been checked by a certified photogrammetrist.

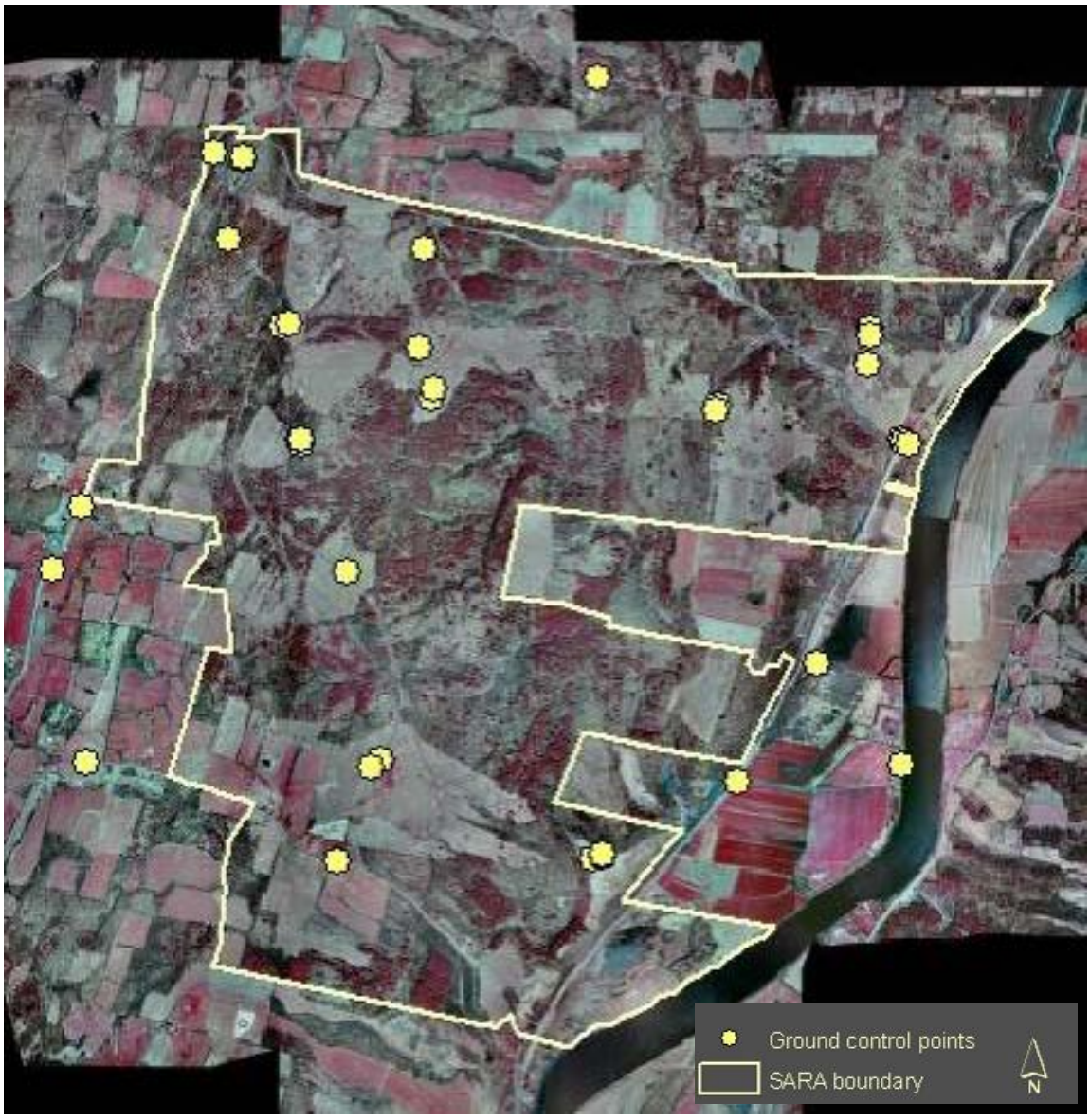


Figure 9. Ground control points (38) used to calculate horizontal positional accuracy of the Saratoga National Historical Park photomosaic.

Thematic Accuracy Assessment

Thematic accuracy assessment estimates the percentage of locations on a map that have been correctly classified by the mapping process. A correctly classified location is defined as a location whose class as represented by the map (i.e., the sample data label), matches that which a ground observer would observe at the same location (i.e., the reference data label) (ESRI et al. 1994, Lea and Curtis 2010). Since it is derived from a closeup, rather than remotely sensed, observation, the reference data label is assumed to be the most accurate representation of class at a location.

In addition to the overall thematic accuracy of a map, the thematic accuracy of individual map classes can be assessed. The accuracy of individual map classes has two components: (1) user's accuracy and (2) producer's accuracy. User's accuracy (ESRI et al. 1994, Lea and Curtis 2010,

Congalton and Green 2009) is the percentage of locations in a class that have been mapped accurately (or 100% minus the rate of errors of commission). Producer's accuracy is the percentage of occurrences of the class (as assessed on the ground) that have been accurately represented by the map (or 100% minus the rate of errors of omission).

Sample Data Generation

NYNHP used a variation of the NVIP protocols (ESRI et al. 1994, Lea and Curtis 2010) to assess the thematic accuracy of association level map classes of the 2006 revised preliminary map. Under these protocols, a simple random sample of locations (destination points) of prescribed size is selected from each map class. An observer, who is not informed of the identity of the map class (i.e., the association) from which individual destination point was selected, navigates to each destination point in the field and identifies the vegetation present at the point. Estimated user's accuracy for the class is calculated as the number of matches between sample data label values and reference data label values divided by the number of destination points allocated to the map class. The individual simple random samples for each of the individual map classes are pooled together to estimate overall accuracy (stratified random design). Because the inference area population of each simple random sample (each individual map class) may, and usually does, vary, the probability of inclusion of individual observations (destination points) varies and must be adjusted according to the map class size, when pooling multiple simple random samples into a stratified random design (Czaplewski 2003. Congalton and Green 2009, Lea and Curtis 2010). Similarly, reference data labels of a class are usually made in multiple map classes and also represent a stratified random, rather than simple random, design. The corrections for estimation under a stratified random design, which was not addressed in the original (ESRI et al. 1994) NPS AA protocols, is accomplished by converting observations into a proportional or population contingency table (Congalton and Green 2009, Lea and Curtis 2010).

Because the AA was designed before the revised AA sampling protocols (Lea and Curtis 2010), the individual map class sample size guidance of the original NPS AA protocols (ESRI et al. 1994) were followed to determine the number of destination points for each map class represented by an association.

Scenario A: The map class is abundant. It covers more than 50 hectares in total area and consists of at least 30 polygons. In this case, it is recommended that 30 polygons be selected at random from the set of polygons labeled as belonging to the map class. One AA destination point will be assigned to each of the 30 selected polygons.

Scenario B: The map class is relatively abundant. It covers more than 50 hectares in total area but consists of fewer than 30 polygons. In this case, it is recommended that 20 polygons be selected at random from the set of polygons labeled as belonging to the map class, and that one sampling point be assigned to each of the 20 selected polygons. If the map class contains less than 20 polygons, some polygons will contain multiple sampling points. The number of AA destination points assigned to each polygon is determined by the relative area of that polygon compared with the other polygons in that map class.

Scenario C: The map class is relatively rare. It covers less than 50 hectares in total area but consists of more than 30 polygons. In this case, it is recommended that 20 polygons be selected at random from the set of polygons labeled as belonging to the map class. One AA destination point will be assigned to each of the 20 selected polygons.

Scenario D: The map class is rare. It has 5–30 polygons and covers less than 50 hectares. In this case, it is recommended that five polygons be selected at random from the set of polygons labeled as belonging to the map class. One AA destination point will be assigned to each of the five selected polygons.

Scenario E: The map class is very rare. It has fewer than five polygons and occupies less than 50 hectares of the total area. In this case, it is recommended that one AA destination point be assigned to each polygon.

Polygons labeled with Anderson Level I and II categories (Anderson et al. 1976) were not included in the thematic AA sampling.

The locations of individual destination points were selected using a two-stage design. In the first stage, the Create Random Selection tool in Hawth's Analysis Tools was used in ArcGIS 9.2 (Beyer 2006, ESRI 1999-2006) to select individual polygons that would receive AA destination points.

In the second stage, the position(s) of one or more individual destination points was determined within the polygons selected in the first stage. First, a buffer zone was created 15 m (49.3 ft) in from the polygon boundary to prevent the placing of random AA destination points close enough to the polygon boundaries that GPS navigational and positioning error might present ambiguity as to which map class was observed (Lea and Curtis 2010). The value of 15 meters was established because it is the average error of the GPS receivers used by staff for this project. The Generate Random Points tool in Hawth's Analysis Tools was used to randomly determine the location of the AA destination points within the polygon selected in the first stage. No AA destination points were placed within 15 meters of a polygon boundary, unless the transition zone completely subsumed the polygon, which occurred in several situations because a given polygon was either too small, or too narrow, to support a 15-meter transition zone. In these cases, the entire polygon was used as the sample "point" with the exact location of the field survey left to the discretion of the ecologist performing the AA. These AA destination points are spatially represented by the centroid of each of these polygons, in the AA shapefile, and differentiated by unique identification in the attribute table.

Four hundred thirty-eight AA destination points were generated prior to conducting field sampling in 2006 and applied to the 2006 revised preliminary map (Figure 10, Figure 11).

Reference Data Labeling (Field Data Collection)

From July 12 to September 22, 2006 NYNHP Associate Ecologist Jennifer Garrett attempted to navigate to as many of the 438 GIS-generated AA destination points as possible using a Garmin 60Cx series GPS receiver (18 field days total). The GPS receiver was set to UTM Zone 18, NAD 1983, meters. In most cases, bearing and distance vectors were used to navigate to within approximately 10 m of AA destination points for open associations, or 20 m for forested

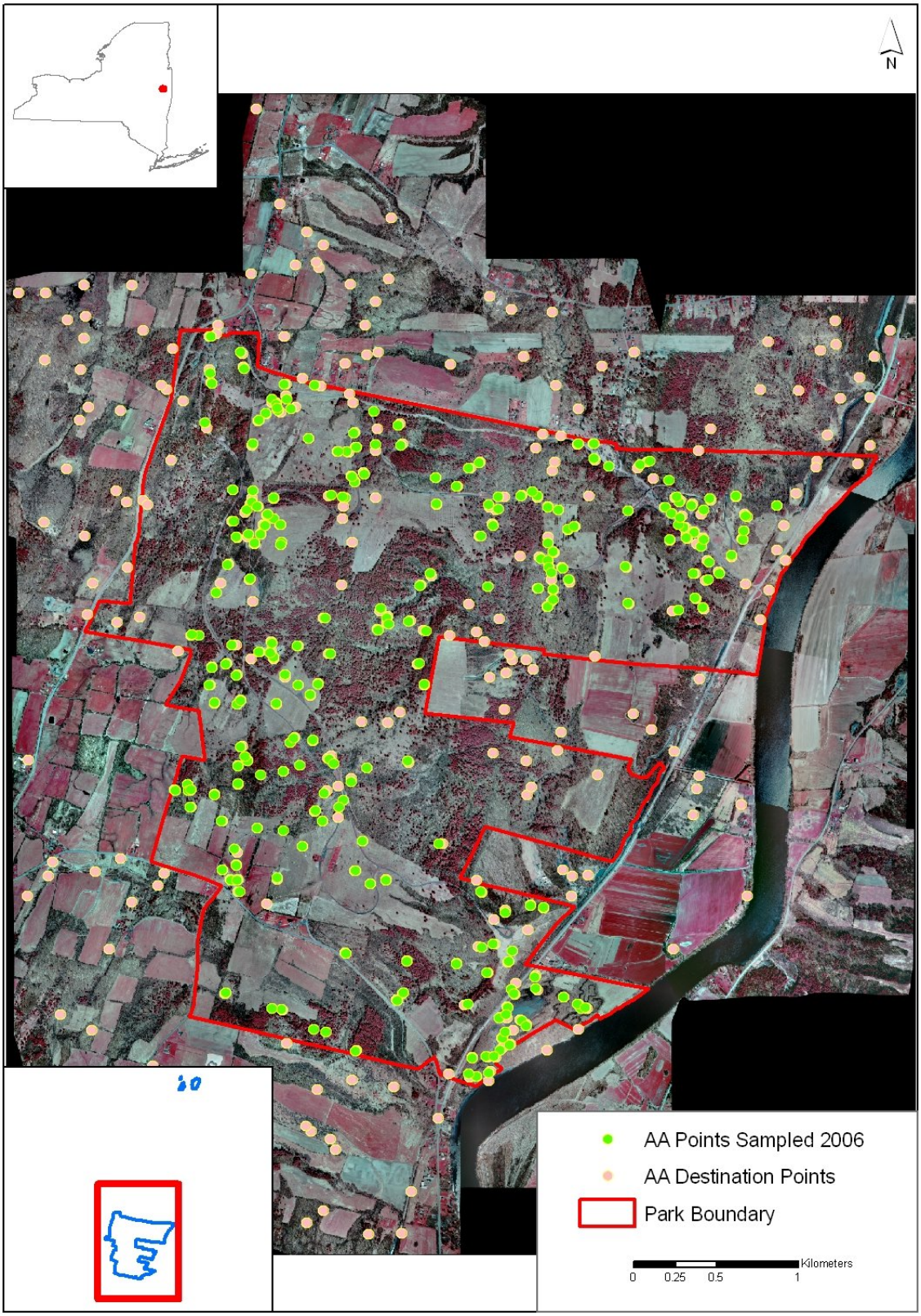


Figure 10. Location of Accuracy Assessment (AA) destination points (395) and AA points sampled (223 + 10 reference observation points) in 2006 within the Battlefield Unit of Saratoga National Historical Park.

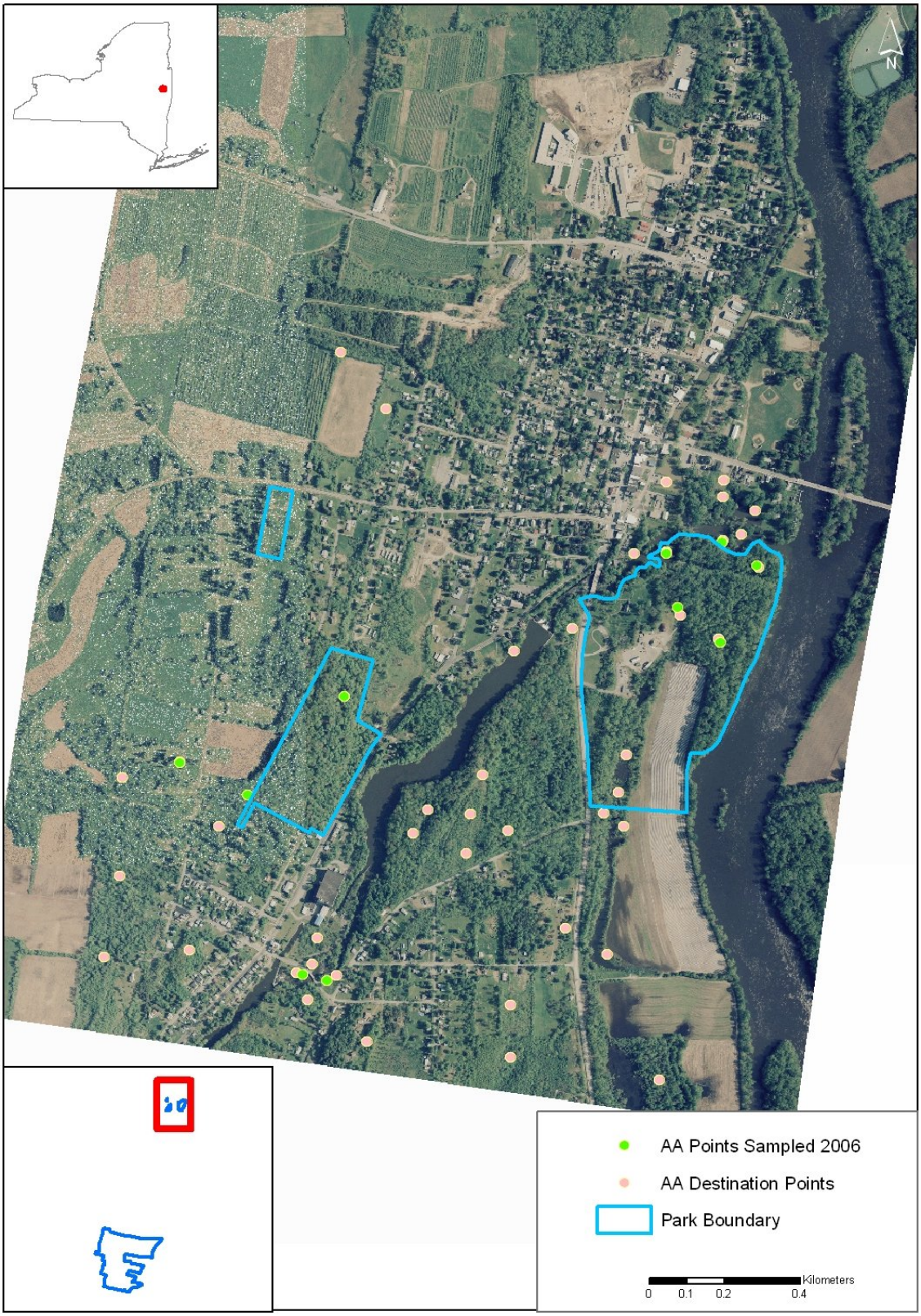


Figure 11. Location of Accuracy Assessment (AA) destination points (43) and AA points sampled (8 + 2 reference observation points) in 2006 within the Old Saratoga Unit of Saratoga National Historical Park.

associations, while remaining within the target polygon as much as possible. These distances were selected based on the plot size recommended for the sampled types.

At each destination point visited, GPS coordinates were collected and the vegetation key was used to classify the vegetation to the association level (i.e., to establish a reference data value (Lea and Curtis 2010) for each AA point to which the sample data value would be compared). These attribute and positional data were collected digitally in the field using an iPAQ hand-held computer with data entry software (NYNHP Hand-Held Database - HHDB) and imported to the NYNHP Field Form Database (FFDB). Sample screen shots from the HHDB used for the AA task within this project are included in Appendix B. Two hundred and thirty one (52.7%) out of the 438 GIS-generated AA destination points were sampled (Figure 10, Figure 11). and subsequently included in the project's PLOTS database package. Accuracy estimations are based on the reference data values that were entered by NYNHP into the PLOTS database.

Calculations of Accuracies

Sample Data Labeling

To compute accuracy, sample data (i.e., map class) labels were applied to each AA observation in ArcGIS 10.0 using the following steps. A spatial join of the AA field observation shapefile (with positions collected by GPS) and the vegetation polygon files representing the 2006 revised preliminary (2006 draft) of the maps was made, yielding a table that applied the association mapped to each, based upon the point's location within the association map. This table was exported to Microsoft Excel spreadsheet. Accuracy estimations are based on the positional data values that were recorded by NYNHP in the AA point shape file and the attribute data values of the polygons in which they were located, as represented by the 2006 revised preliminary vegetation association map.

For a small number of sampled AA points, sample data labels were revised prior to analysis to handle ambiguous situations caused by classification changes subsequent to the thematic AA. First, several associations that were attributed to SARA prior to the thematic AA and whose map classes received sampled AA points were determined, subsequent to the AA, not to occur at SARA. In order to allow these AA observations to contribute to assessment of the map, the original sample data labels were re-assigned to that of the most similar association remaining in the classification after the thematic AA. Specifically, reassignments were made from the former Dogwood - Willow Swamp (CEGL002186) to the Speckled Alder Swamp (CEGL002381), from the former Maple - Ash - Elm Swamp Forest (CEGL005038) to the Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), from the former Red Maple - Tussock Sedge Wooded Marsh (CEGL006119) to the Red Maple - Lake Sedge Wooded Marsh (CEGL006105), from the former *Pinus* spp. Planted Forest (CEGL006313) to the White Pine Plantation (CEGL007178), and from the former Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301) to the Dry, Rich Oak - Hickory Forest (also CEGL006301). Additionally, all sample data labels of Northeastern Oak - Red Maple Successional Forest (CEGL006506) were reassigned to the Eastern White Pine Successional Forest (CEGL007944), since all polygons assigned by the 2006 revised preliminary map to that class were similarly also reassigned (new map units were assigned to Northeastern Oak - Red Maple Successional Forest (CEGL006506) in the final map). Finally, sample labels for two observations

that were positioned within non-vegetated (Anderson 1976) map classes were reassigned to that of the nearest map class with a USNVC assignment. In both cases, the nearest USNVC class was within a few meters of the observation's recorded position, and the discrepancy was assumed to be caused by field positioning error because no reference data values representing non-vegetated (Anderson 1976) classes were recorded for any observations during the AA field campaign.

The first stage of the sample data generation, the random selection of individual polygons, contributed some spatial balance to the AA design, but also introduced a polygon-based bias that required correction in order to achieve the point-based design specified by NPS AA protocols (ESRI et al. 1994, Lea and Curtis 2010). A point-based design requires that all potential destination points within an individual map class have an equal probability of selection. The first stage employerd by this project allowed small polygons an equal probability of selection to that of large polygons, meaning that treating all sampled AA points equally as a single observation would that locations within small polygons would be disproportionately represented. To correct for this bias, AA point observations were weighted by the area of the polygons in which they were located. Each AA observation was assigned a weight, w_{ij}, which is calculated as follows.

$$w_{ij} = \left(\frac{A_{POLYGON_{ij}}}{\Sigma A_{POLYGONS_{i\bullet}}} \right) * \left(\frac{N_{SAMPLE_{i\bullet}}}{N_{POLYGON_{ij}}} \right)$$

For which:

w_{ij}	=the weight assigned to observation *j* in map class *i*
$A_{POLYGONij}$	=the area of the single polygon in which observation *j* is located
$\Sigma A_{POLYGONi.}$	=the total area of all polygons in map class *i* in the project that have observations in them
$N_{SAMPLE\ i.}$	=the area of the single polygon in which observation *j* is located
$N_{POLYGONi.}$	=the total number of observations in the single polygon in which observation *j* is located

The weighting process assigned each AA observation a decimal number proportional to its proper representation of its assigned map class area. For example, AA observation SARA.50 in map class CEGL006293 was weighted as 2.50 observations because it was placed in a polygon that is relatively large (6.6 hectares) compared to the other polygons in the map class CEGL006293. The sum of all weighted values within a single map class (sampling stratum) remained equal to the total number of observations assigned to the class.

Accuracy Estimation

Reference data (field) label values for each AA observation were imported into a Microsoft Excel spreadsheet table from the PLOTS database. In Excel, a sample contingency table was created as a pivot table from the original spatial join table with the AA observation data records (with the reference data labels added). The pivot table rows represented the map class labels (extracted from the spatial database field CEGL1). The pivot table columns represented a corresponding reference

data label values. Each table cell contained a summed number of all observations (often a decimal value because of the weighting) that had a unique combination of a map class label and reference data label represented by the row and column intersection at the cell.

The sample contingency table was converted to a population contingency table using the methods described by Lea and Curtis (2010) by weighting the sample contingency table values by their respective map class areas (as necessary to account for the effects of the stratified random design on overall accuracy and producer's accuracies). Individual class user's accuracies were estimated as the total proportion of correctly mapped observations in the class (cells at the intersections of rows and labels having the same value) divided by the sum of the row proportions for the class. Individual class producer's accuracies were estimated as the total proportion of correctly mapped observations in the class divided by the sum of the column proportions for the class. Overall accuracy was estimated as the sum of all correctly mapped proportions (the sum of all values along the table diagonal) divided by the sum of all proportions (or 1.00).

In order to provide information for uses of the map that may demand more accuracy and require less thematic resolution, the accuracies of higher level units within the USNVC (alliances, groups, macrogroups, divisions/formations, and subclasses/classes) were estimated by aggregating the applicable cell proportions in the population contingency table for their member associations (Lea and Curtis 2010) (see Tables C-3 through C-12 in Appendix C).

Results

Vegetation Classification and Characterization

In addition to the 44 associations recognized prior to the thematic AA, nine additional vegetation associations were encountered and classified during AA and added to the map as new mapping units/vegetation types.

Detailed local descriptions for the 53 vegetation associations (see Appendix F) were written based on plot data, compositional statistics, photographs of each plot, thematic AA data, field ecologist observations within SARA and adjacent environs, and the other research. These vegetation associations were then crosswalked to the USNVC which contains range-wide global descriptions for each association that were added to the local descriptions. Each vegetation association is also crosswalked to Ecological Communities of New York State (Edinger et al. 2002; see Tables F-1 and F-2 in Appendix F). The associations and their placement within the USNVC hierarchy are listed in Tables 3-6.

The 53 vegetation associations recognized for SARA fall into 46 different USNVC alliances, and there are only four alliances that have multiple associations at SARA: the Northern Red Oak – (Sugar Maple) Forest Alliance (with four associations at SARA), the (Red Maple, Silver Maple) – American Elm Temporarily Flooded Forest Alliance (two associations), the Eastern Hemlock – Yellow Birch Forest Alliance (three associations), and the Pickerelweed – Green Arrow-arum Semipermanently Flooded Herbaceous Alliance (two associations). At the time of publication of this report, all USNVC alliances were undergoing review and revision due to extensive changes imposed by revision of the upper hierarchy levels (FGDC 2008). The USNVC revisions have created a situation in which the original alliances of which the 53 associations were members are not nested within higher hierarchy units (i.e., alliances attributed to associations in Appendix F are not always members of a single group or macrogroup). The revisions are expected to have been completed in 2014 and will result in at least some different alliance assignments from those documented in Appendix F.

The 53 USNVC associations recorded at SARA fall into 19 USNVC groups, 15 USNVC macrogroups, eight USNVC divisions and formations, and four USNVC subclasses and classes (divisions have a 1:1 correspondence with formations at the scale of SARA, as do subclasses and classes). Thus, at the scale of SARA, the most significant changes in thematic resolution within the USNVC likely occur from association/alliance levels (53/46 units) to the group/macrogroup levels (19/15 units), from the group/macrogroup levels to the division/formation levels (8 units), and from division/formation levels to the subclass/class levels (4 units).

Vegetation Mapping

Approximately 1,169 hectares in 963 polygons within the boundaries of SARA and about 2,017 hectares of immediate park environs (for a grand total of about 3,186 hectares in 2,040 polygons) were mapped by this project (Table 7, Figures 12 and 13).

Table 3. USNVC units and hierarchy placement for upland forests at Saratoga National Historical Park.

Class / Subclass: Forest and Woodland (1) / Temperate Forest (1.C)
Formation Cool Temperate Forest (1.C.2)
Division: Eastern North American Cool Temperate Forest (D008)
Macrogroup: Central Oak-Hardwood and Pine Forest (M012)
Group: Appalachian Oak - Chestnut Forest Group (G015)
Association: Shale Talus Slope Woodland (CEGL006074)
Group: Northeastern and North-Central Oak-Hickory Forest Group (G158)
Association: Dry, Rich Oak - Hickory Forest (CEGL006301)
Association: Northeastern Dry Oak - Hickory Forest (CEGL006336)
Association: Upland/Wetland Transitional Forest (CEGL006000)
Macrogroup: Eastern North American Ruderal Forest and Plantation (M013)
Group: Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Association: Black Locust Successional Forest (CEGL007279)
Association: Early-Successional Woodland/Forest (CEGL006303)
Association: White Pine Successional Forest (CEGL007944)
Association: Northeastern Oak - Red Maple Successional Forest (CEGL006506)
Association: Northeastern Modified Successional Forest (CEGL006599)
Group: Northern and Central Conifer and Hardwood Plantation Group (G032)
Association: White Pine Plantation (CEGL007178)
Association: Norway Spruce Plantation (CEGL007167)
Macrogroup: Northern Mesic Hardwood and Conifer Forest (M014)
Group: Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Association: Hemlock - Beech - Oak Forest (CEGL006088)
Association: Hemlock – Northern Hardwood Forest (CEGL006109)
Association: White Pine - Hemlock Dry-Mesic Forest (CEGL006328)
Association: White Pine - Oak Forest (CEGL006293)
Association: Northern Hardwood – White Pine Forest (CEGL005005)
Association: Northern Red Oak - Northern Hardwood Forest (CEGL006173)
Association: Mesic Sugar Maple – Ash - Oak – Hickory Forest (CEGL006046)
Association: Semi-rich Northern Hardwood Forest (CEGL006211)
Macrogroup: Central Mesophytic-Hardwood Forest (M153)
Group: Appalachian and Interior Mesophytic Forest Group (G020)
Association: American Beech - Maple Glaciated Forest (CEGL005013)

Table 4. USNVC units and hierarchy placement for floodplain and swamp forests at Saratoga National Historical Park.

Class / Subclass: Forest and Woodland (1) / Temperate Forest (1.C) (continued from Table 3)
- **Formation:** Temperate Flooded and Swamp Forest (1.C.3)
  - **Division:** Eastern North American Flooded and Swamp Forest (D011)
    - **Macrogroup:** Northern and Central Floodplain Forest and Scrub (M029)
      - **Group:** Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
        - **Association:** Boxelder Floodplain Forest (CEGL005033)
        - **Association:** Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)
        - **Association:** Silver Maple - Elm Floodplain Forest (CEGL006001)
        - **Association:** Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176)
        - **Association:** Silver Maple Floodplain Levee Forest (CEGL006147)
        - **Association:** Terrace Hardwood Floodplain Forest (CEGL006114)
    - **Macrogroup:** Northern and Central Swamp Forest (M030)
      - **Group:** Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)
        - **Association:** Elm - Ash / Skunk Cabbage Swamp (CEGL006966)
        - **Association:** Red Maple - Lake Sedge Wooded Marsh (CEGL006105)
        - **Association:** Southern New England Red Maple Seepage Swamp (CEGL006406)
      - **Group:** Central Flatwoods and Pond Forest Group (G597)

Association: Swamp White Oak Floodplain Forest (CEGL006386)

Table 5. USNVC units and hierarchy placement for shrublands and herbaceous vegetation at Saratoga National Historical Park.

Class / Subclass: Shrubland and Grassland (2) / Temperate and Boreal Shrubland and Grassland (2.C)
Formation / Temperate Grassland, Meadow, and Shrubland (2.C.1) /
Division: Eastern North American Grassland, Meadow, and Shrubland (D024)
Macrogroup: Eastern North American Ruderal Grassland and Shrubland (M123)
Group: Northern and Central Ruderal Meadow and Shrubland Group (G059)
Association: Bracken Grassland (CEGL005142)
Association: Little Bluestem Old Field (CEGL006333)
Association: Northeastern Old Field (CEGL006107)
Association: Northeastern Successional Shrubland (CEGL006451)
Formation: Temperate and Boreal Scrub and Herb Coastal Vegetation (2.C.3)
Division: Eastern North American Dune and Coastal Grassland and Shrubland (D026)
Macrogroup: Eastern North American Beach, Shoreline, and Flat (M176)
Group: Eastern North American Lake Flat and Beach Group (G342)
Association: Eastern Woodland Vernal Pool (CEGL006453)
Formation: Temperate and Boreal Bog and Fen (2.C.4)
Division: North American Bog and Fen (D029)
Macrogroup: Appalachian, Interior Plateau, and Prairie Fen (M061)
Group: Northeastern and Appalachian Forest Seep Group (G189)
Association: Skunk Cabbage - Jewelweed Seep (CEGL006567)
Formation: Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division: Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030) **Macrogroup:** Eastern North American Wet Meadow and Marsh (M069)
Group: Eastern North American Wet Meadow Group (G112)
Association: Lake Sedge Wet Meadow (CEGL002256)
Association: Mixed Forb Marsh (CEGL006446)
Association: Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)
Association: Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)
Association: Woolgrass Marsh (CEGL006349)
Group: Eastern North American Freshwater Marsh Group (G125)
Association: Eastern Cattail Marsh (CEGL006153)
Association: Northeastern Leafy Forb Marsh (CEGL006191)
Association: Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)
Association: Wild Rice Marsh (CEGL002382)
Macrogroup: Northern and Central Tall Shrub Wetland (M160)
Group: Northern and Central Shrub Swamp Group (G167)
Association: Common Buttonbush Shrub Swamp (CEGL006069)
Association: Speckled Alder Swamp (CEGL002381)
Macrogroup: Eastern North American Ruderal Wet Meadow and Marsh (M303)
Group: Northern and Central Ruderal Wet Meadow and Marsh Group (G556)
Association: Common Reed Marsh (CEGL004141)
Association: Purple Loosestrife Wetland (CEGL006403)
Association: Reed Canarygrass Eastern Marsh (CEGL006044)
Macrogroup: Eastern North American Riverscour Wetland (M165)
Group: Northern and Central Riverscour Wetland Group (G194)
Association: Hairyfruit Sedge Wetland (CEGL006447)

Table 6. USNVC units and hierarchy placement for aquatic and rock vegetation at Saratoga National Historical Park.

Class / Subclass: Aquatic Vegetation (5) / Freshwater Aquatic Vegetation (5.B)
Formation: Freshwater Aquatic Vegetation (5.B.1)
Division: North American Freshwater Aquatic Vegetation (D049)
Macrogroup: Eastern North American Freshwater Aquatic Vegetation (M108)
Group: Eastern North American Freshwater Aquatic Vegetation Group (G114)
Association: Common Duckweed Herbaceous Vegetation (CEGL005451)
Class / Subclass Nonvascular and Sparse Vascular Rock Vegetation (6) / Freshwater Aquatic Vegetation (5.B)
Formation: Temperate, and Boreal Cliff, Scree, and Rock Vegetation (6.B.2)
Division: Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)
Macrogroup: Eastern North American Cliff, and Rock Vegetation (M111)
Group: Eastern North American Talus and Bluff Group (G340)
Association: Temperate Shale Cliffs and Talus (CEGL006535)

Table 7. Plot, accuracy assessment, and map class statistics for vegetation and land cover classes at Saratoga National Historical Park (see bottom of table for explanation of table headers).

USNVC Vegetation Association (USNVC code)	n (Class. Plots)[a]	n (Ref. Obser. Points)[b]	n (AA Dest. Points)[c]	n (AA Points Visited)[d]	n (AA Refer. Data Values)[e]	Map Version[f]	Within Park Boundaries		Entire Map		
							n (polygons)[g]	Area (hectares)[h]	n (polygons)[g]	Area (hectares)[h]	Predicted Area (hectares)[i]
Shale Talus Slope Woodland (CEGL006074)	0	0	0	0	1	Final	1	0.19	1	0.19	0.19
						2006	0	0.00	0	0.00	
Dry, Rich Oak - Hickory Forest (CEGL006301)	9	2	12	5	8	Final	15	33.62	25	67.67	36.67
						2006	6	36.34	16	70.66	
Northeastern Dry Oak - Hickory Forest (CEGL006336)	0	0	18	16	2	Final	5	16.91	5	56.18	35.72
						2006	9	57.53	9	96.91	
Upland/Wetland Transitional Forest (CEGL006000)	1	0	0	0	1	Final	2	3.64	2	3.64	9.59
						2006	0	0.00	0	0.00	
Black Locust Successional Forest (CEGL007279)	1	0	1	1	0	Final	3	2.55	3	2.55	0.00
						2006	1	2.76	1	2.76	
Early-Successional Woodland / Forest (CEGL006303)	4	0	30	8	8	Final	74	95.46	161	236.65	119.97
						2006	78	96.64	167	239.55	
White Pine Successional Forest (CEGL007944)	11	2	33	17	28	Final	96	261.44	129	339.43	486.70
						2006	0	0.00	0	0.00	
Northeastern Oak - Red Maple Succ. Forest (CEGL006506)	1	0	0	0	4	Final	10	32.80	41	123.68	7.30
						2006	95	255.29	161	426.95	
Northeastern Modified Succ. Forest (CEGL006599)	2	0	20	7	11	Final	13	26.70	15	29.39	212.11
						2006	15	50.44	29	84.91	
White Pine Plantation (CEGL007178)	4	0	10	5	2	Final	8	15.85	16	22.44	7.95
						2006	11	22.62	18	28.97	
Norway Spruce Plantation (CEGL007167)	0	1	0	0	0	Final	0	0.00	1	0.21	N/A
						2006	0	0.00	0	0.00	
Hemlock - Beech - Oak Forest (CEGL006088)	8	2	20	15	7	Final	10	23.06	13	43.68	16.02
						2006	9	30.35	12	50.10	
Hemlock – Northern Hardwood Forest (CEGL006109)	0	0	0	0	1	Final	1	6.58	1	6.58	24.60
						2006	0	0.00	0	0.00	
White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	2	0	0	0	3	Final	3	3.02	4	3.33	14.54
						2006	0	0.00	0	0.00	
White Pine - Oak Forest (CEGL006293)	5	0	30	14	2	Final	15	37.32	23	91.30	21.60
						2006	27	86.51	35	137.70	

Table 7. Plot, accuracy assessment, and map class statistics for vegetation and land cover classes at Saratoga National Historical Park (continued) (see bottom of table for explanation of table headers).

USNVC Vegetation Association (USNVC code)	n (Class. Plots)[a]	n (Ref. Obser. Points)[b]	n (AA Dest. Points)[c]	n (AA Points Visited)[d]	n (AA Refer. Data Values)[e]	Map Version[f]	Within Park Boundaries		Entire Map		Predicted Area (hectares)[i]
							n (polygons)[g]	Area (hectares)[h]	n (polygons)[g]	Area (hectares)[h]	
Northern Hardwood – White Pine Forest (CEGL005005)	0	0	0	0	2	Final	2	8.96	2	8.96	54.25
						2006	0	0.00	0	0.00	
Northern Red Oak - Northern Hardwd. Forest (CEGL006173)	3	0	20	4	2	Final	7	13.16	14	84.00	38.82
						2006	7	12.30	14	82.97	
Mesic Sugar Maple–Ash-Oak–Hickory Forest (CEGL006046)	0	0	0	0	3	Final	3	18.43	3	18.67	14.08
						2006	0	0.00	0	0.00	
Semi-rich Northern Hardwood Forest (CEGL006211)	2	0	3	2	6	Final	8	21.67	8	26.57	79.21
						2006	3	7.24	3	12.14	
American Beech - Maple Glac. Forest (CEGL005013)	1	0	0	0	1	Final	2	3.04	2	3.04	51.72
						2006	0	0.00	0	0.00	
Boxelder Floodplain Forest (CEGL005033)	2	0	4	4	2	Final	3	1.79	3	1.79	0.58
						2006	4	2.47	4	2.47	
Green Ash - Mixed Hardwood Floodpl. Forest (CEGL006575)	5	0	1	1	12	Final	20	28.20	31	50.08	22.37
						2006	1	7.41	1	8.73	
Silver Maple - Elm Floodplain Forest (CEGL006001)	2	0	5	5	0	Final	11	0.96	12	1.42	0.00
						2006	17	4.22	18	4.63	
Silver Maple / Sensitive Fern Floodpl. Forest (CEGL006176)	12	0	20	10	10	Final	24	19.04	40	39.98	21.13
						2006	19	9.53	31	18.68	
Silver Maple Floodplain Levee Forest (CEGL006147)	2	0	2	1	2	Final	2	7.64	3	7.99	25.08
						2006	2	4.81	2	6.26	
Terrace Hardwood Floodplain Forest (CEGL006114)	1	0	5	2	0	Final	1	0.00	5	6.09	0.00
						2006	1	0.00	8	7.35	
Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	1	0	2	1	1	Final	1	0.34	2	0.83	0.83
						2006	1	0.34	2	0.83	
Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	0	0	1	1	1	Final	1	0.12	1	0.12	3.65
						2006	1	3.25	1	3.25	
S. New England Red Maple Seepg. Swamp (CEGL006406)	0	2	20	3	0	Final	14	8.07	29	47.71	0.00
						2006	17	7.80	32	46.29	
Swamp White Oak Floodplain Forest (CEGL006386)	2	0	1	1	4	Final	4	6.26	4	6.41	13.91
						2006	1	4.78	1	4.81	
Bracken Grassland (CEGL005142)	2	0	5	5	5	Final	5	4.47	5	4.47	4.47
						2006	5	4.47	5	4.47	

Table 7. Plot, accuracy assessment, and map class statistics for vegetation and land cover classes at Saratoga National Historical Park (continued) (see bottom of table for explanation of table headers).

USNVC Vegetation Association (USNVC code)	n (Class. Plots)[a]	n (Ref. Obser. Points)[b]	n (AA Dest. Points)[c]	n (AA Points Visited)[d]	n (AA Refer. Data Values)[e]	Map Version[f]	Within Park Boundaries		Entire Map		Predicted Area (hectares)[i]
							n (polygons)[g]	Area (hectares)[h]	n (polygons)[g]	Area (hectares)[h]	
Little Bluestem Old Field (CEGL006333)	26	2	29	23	13	Final	70	82.33	70	82.33	53.02
						2006	74	97.20	74	97.20	
Northeastern Old Field (CEGL006107)	11	0	51	34	36	Final	107	147.33	157	209.24	221.10
						2006	101	143.74	153	205.65	
Northeastern Successional Shrubland (CEGL006451)	7	2	30	11	13	Final	38	73.93	59	90.31	95.33
						2006	28	68.34	50	84.73	
Eastern Woodland Vernal Pool (CEGL006453)	4	0	5	5	4	Final	18	1.03	18	1.03	0.91
						2006	18	0.98	18	0.98	
Skunk Cabbage - Jewelweed Seep (CEGL006567)	1	0	1	1	0	Final	1	0.12	1	0.12	0.00
						2006	1	0.19	1	0.19	
Lake Sedge Wet Meadow (CEGL002256)	1	0	0	0	0	Final	1	0.24	1	0.24	N/A
						2006	0	0.00	0	0.00	
Mixed Forb Marsh (CEGL006446)	13	2	5	3	9	Final	15	8.82	15	10.84	35.76
						2006	11	7.61	11	9.63	
Seasonally Flooded Mixed Gram. Meadow (CEGL006519)	0	0	0	0	1	Final	1	0.15	1	0.16	0.78
						2006	0	0.00	0	0.00	
Steeplebush/Reed Canarygr. Succ. Wet Mdw (CEGL006571)	2	0	3	3	2	Final	3	0.48	3	0.48	5.53
						2006	3	0.68	3	0.68	
Woolgrass Marsh (CEGL006349)	2	2	5	5	4	Final	6	4.15	6	4.15	6.57
						2006	5	3.49	5	3.49	
Eastern Cattail Marsh (CEGL006153)	2	0	20	6	0	Final	21	8.95	101	42.29	0.00
						2006	28	10.69	113	44.03	
Northeastern Leafy Forb Marsh (CEGL006191)	4	0	5	2	2	Final	5	1.33	10	3.43	9.56
						2006	3	2.28	7	4.32	
Rice Cutgrass - Fowl Manna. Wet Meadow (CEGL005106)	1	2	2	0	1	Final	4	2.17	5	2.52	0.28
						2006	1	0.21	2	0.56	
Wild Rice Marsh (CEGL002382)	1	0	1	0	0	Final	0	0.00	1	0.09	N/A
						2006	0	0.00	1	0.09	
Common Buttonbush Shrub Swamp (CEGL006069)	5	0	3	2	4	Final	6	3.67	6	3.99	6.12
						2006	3	1.50	3	1.80	
Speckled Alder Swamp (CEGL002381)	0	0	5	1	1	Final	1	0.22	7	3.63	4.94
						2006	1	0.24	7	3.65	

Table 7. Plot, accuracy assessment, and map class statistics for vegetation and land cover classes at Saratoga National Historical Park (continued) (see bottom of table for explanation of table headers).

USNVC Vegetation Association (USNVC code)	n (Class. Plots)[a]	n (Ref. Obser. Points)[b]	n (AA Dest. Points)[c]	n (AA Points Visited)[d]	n (AA Refer. Data Values)[e]	Map Version[f]	Within Park Boundaries		Entire Map		Predicted Area (hectares)[i]
							n (polygons)[g]	Area (hectares)[h]	n (polygons)[g]	Area (hectares)[h]	
Common Reed Marsh (CEGL004141)						Final	1	0.04	1	0.04	0.11
	0	0	0	0	1	2006	0	0.00	0	0.00	
Purple Loosestrife Wetland (CEGL006403)						Final	1	0.18	3	0.77	3.10
	1	0	1	0	1	2006	0	0.00	1	0.45	
Reed Canarygrass Eastern Marsh (CEGL006044)						Final	25	12.38	25	12.54	26.13
	10	0	5	4	8	2006	12	9.60	12	9.76	
Hairyfruit Sedge Wetland (CEGL006447)						Final	4	1.06	4	1.06	16.10
	1	1	2	2	2	2006	2	0.69	2	0.69	
Common Duckweed Herbac. Vegetation (CEGL005451)						Final	6	1.64	14	4.00	N/A
	3	0	0	0	0	2006	0	0.00	0	0.00	
Temperate Shale Cliffs and Talus (CEGL006535)						Final	0	0.00	0	0.00	0.00
	1	0	1	1	0	2006	1	0.19	1	0.19	
USNVC CLASS SUBTOTALS						**Final**	**698**	**1051.51**	**1112**	**1808.31**	
	179	**20**	**437**	**231**	**231**	**2006**	**622**	**1054.75**	**1034**	**1809.49**	
ANDERSON CLASSES											
1. Urban or Built-up Land						Final	20	0.56	186	5.49	N/A
	0	0	0	0	0	2006	19	0.55	188	8.19	
11. Residential						Final	3	0.02	49	70.18	N/A
	0	0	0	0	0	2006	2	0.02	44	64.37	
12. Commerical and Services						Final	0	0.00	2	0.65	N/A
	0	0	0	0	0	2006	1	0.00	3	3.69	
13. Industrial						Final	0	0.00	2	0.28	N/A
	0	0	0	0	0	2006	0	0.00	2	0.28	
14. Transportation, Communications, and						Final	153	41.11	300	96.38	N/A
	1	0	0	0	0	2006	171	40.54	326	96.16	
17. Other Urban or Built Up Land						Final	35	6.78	158	91.09	N/A
	2	0	0	0	0	2006	34	6.49	167	91.17	
21. Cropland and Pasture						Final	23	63.98	136	589.77	N/A
	2	0	0	0	0	2006	23	60.65	153	591.32	
22. Orchards, Groves, Vineyards, and Nurseries						Final	0	0.00	5	11.17	N/A
	0	0	0	0	0	2006	0	0.00	5	11.17	

Table 7. Plot, accuracy assessment, and map class statistics for vegetation and land cover classes at Saratoga National Historical Park (continued) (see bottom of table for explanation of table headers).

USNVC Vegetation Association (USNVC code)	n (Class. Plots)[a]	n (Ref. Obser. Points)[b]	n (AA Dest. Points)[c]	n (AA Points Visited)[d]	n (AA Refer. Data Values)[e]	Map Version[f]	Within Park Boundaries		Entire Map		Predicted Area (hectares)[i]
							n (polygons)[g]	Area (hectares)[h]	n (polygons)[g]	Area (hectares)[h]	
31. Herbaceous Rangeland						Final	1	0.04	1	0.04	N/A
	0	0	0	0	0	2006	0	0.00	1	0.09	
32. Shrub and Brush Rangeland						Final	0	0.00	1	0.13	N/A
	0	0	0	0	0	2006	0	0.00	1	0.13	
42. Evergreen Forest Land						Final	0	0.00	0	0.00	N/A
	0	0	0	0	0	2006	0	0.00	1	0.26	
5. Water						Final	4	0.27	26	1.70	N/A
	0	0	0	0	0	2006	7	1.28	35	4.84	
51. Streams and Canals						Final	26	4.32	57	94.84	N/A
	3	0	1	0	0	2006	25	4.31	58	94.82	
53. Reservoirs						Final	0	0.00	3	7.42	N/A
	0	0	0	0	0	2006	0	0.00	3	7.42	
ANDERSON CLASS SUBTOTALS						Final	**265**	**117.08**	**928**	**975.07**	
	0	0	1	0	0	2006	**282**	**113.84**	**987**	**973.89**	
UNCLASSIFIED SUBTOTALS						Final	0	0.00	3	402.22	
	0	0	0	0	0	2006	0	0.00	3	402.22	
GRAND TOTALS						Final	**963**	**1168.59**	**2040**	**3185.60**	
	185	**20**	**438**	**231**	**231**	2006	**904**	**1168.59**	**2021**	**3185.60**	

[a] number of vegetation classification plots assigned to class

[b] number of reference observation points assigned to class

[c] number of accuracy assessment (AA) destination points assigned to map class

[d] number of accuracy assessment (AA) destination points in map class visited (number of accuracy assessment points with sample data label assigned to the map class)

[e] number of accuracy assessment (AA) destination with a reference data value assigned to the map class (number of occasions during AA the class was observed in the field)

[f] version of map to which the map class statistics (area, polygons) apply (2006 = revised preliminary vegetation map (pre-accuracy assessment); Final = 2014 revised map)

[g] number of polygons labeled as the map class

[h] Total area (in hectares) labeled as the map class.

[i] Estimated area on ground to be assigned to map class, accounting for mapping errors (see Lea and Curtis 2010).

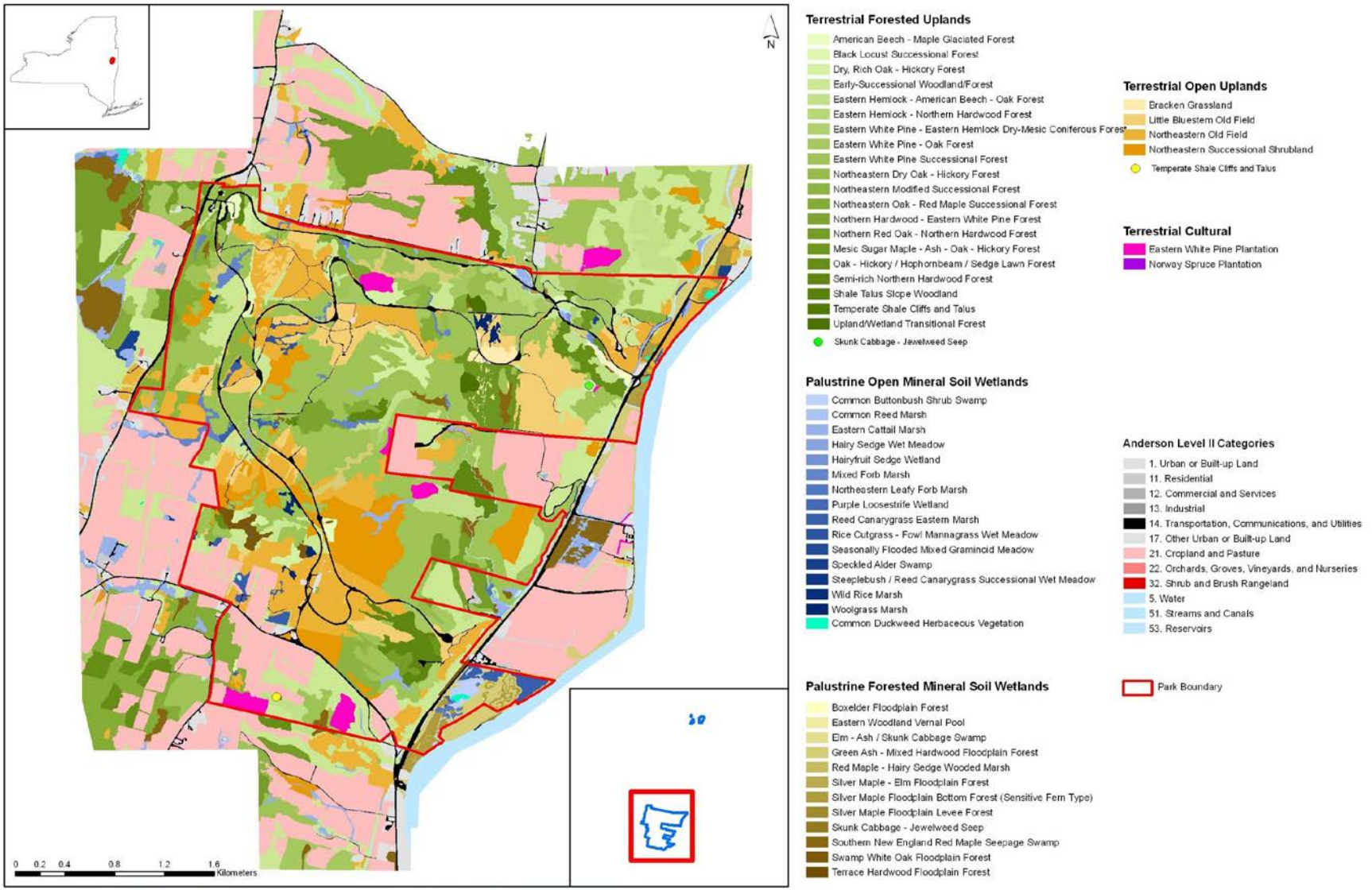


Figure 12. Saratoga National Historical Park vegetation map – Battlefield Unit.

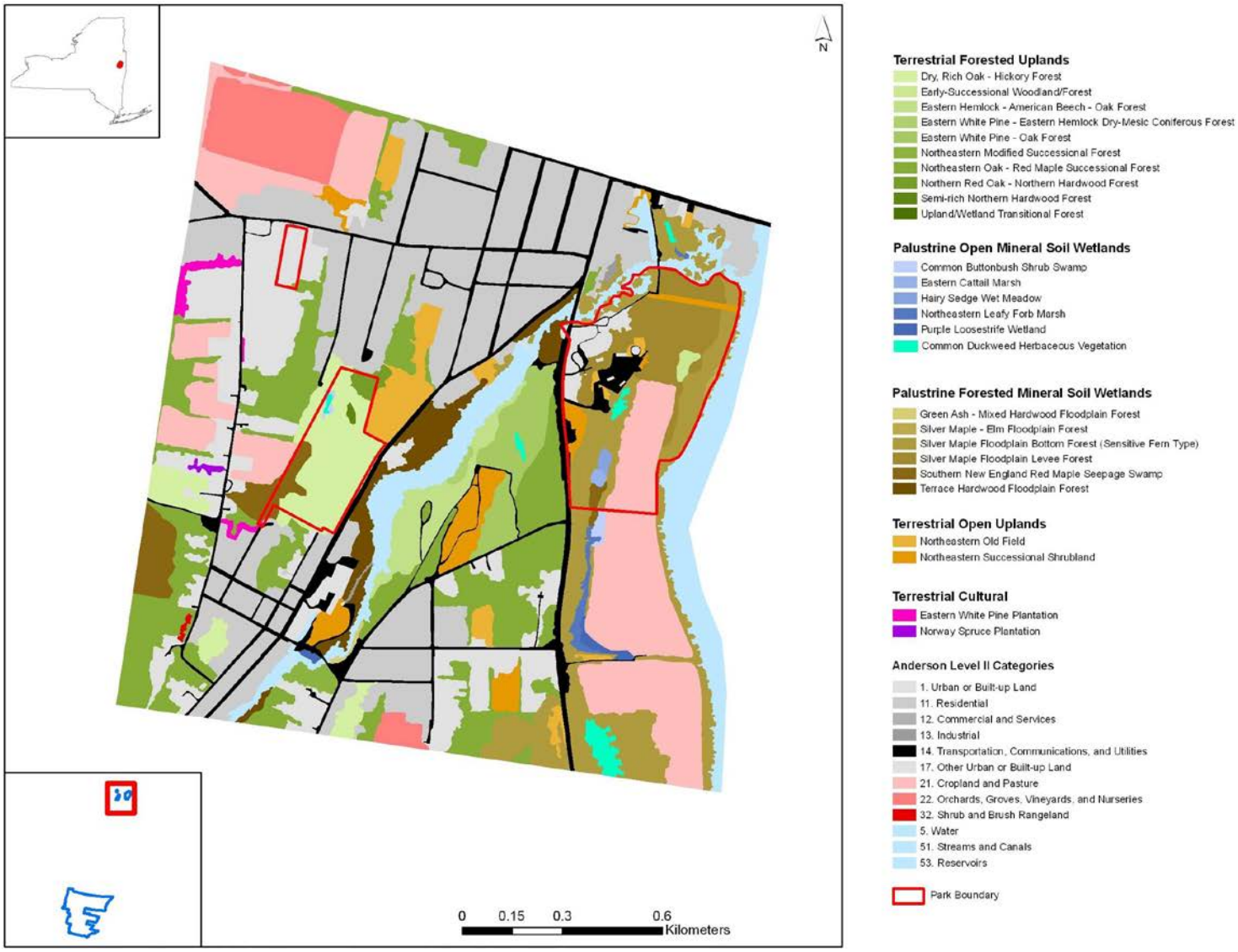


Figure 13. Saratoga National Historical Park vegetation map – Old Saratoga Unit.

Positional Accuracy Assessment

The horizontal positional accuracy of the Battlefield Unit photomosaic is 1.65 meters (5.4 ft), which meets the Class 1 National Map Accuracy Standard (FGDC 1998b). A copy of the spreadsheet containing the x and y coordinates for each ground control point and the accuracy calculation formula is stored in the NCSU archive.

The horizontal positional accuracy of the Old Saratoga Unit orthophotography is 0.91 meters (3 ft). Photo control was performed to meet the American Society of Photogrammetry and Remote Sensing (ASPRS) Class 1 Standard.

Thematic Accuracy Assessment

Thematic accuracy for the 2006 revised preliminary vegetation association map was calculated using the NPS protocols (Lea and Curtis 2010). Map class user's accuracy, which is the probability that a site within an individual map class will be mapped correctly, is calculated as the percentage of correctly mapped observations within a map class divided by the number of observations within that map class, since a simple random sampling design has been used for each map class. Individual class producer's accuracy, which is the probability that a class found on the ground will have been included within its corresponding map class, requires more complex calculations in order to account for the *de facto* stratified random design imposed upon these observations with respect to observations assigned to a single reference label (field-defined) class (Lea and Curtis 2010). With respect to pooling observations of a single reference data class, multiple observations for any class that have been encountered across multiple map classes (i.e., multiple sampling strata of different sizes that cannot be defined in advance of the sampling) each have different probabilities of inclusion in the sample. Similarly, pooling all observations from the multiple map class samples in order to calculate overall map accuracy (the probability that any site represented by the map will be correctly mapped) also requires accounting for the different sized strata imposed by the individual map classes which formed the basis for user's accuracy inference populations. The individual observations (raw counts) are entered into a sample contingency table. These counts and the area occupied by each map class are used to calculate a population contingency table which weights each individual combination of map class labels and field (reference class) labels proportionally to calculate estimated accuracies for observations pooled from multiple sampling strata (Czaplewski 2003, Congalton and Green 2009, Lea and Curtis 2010).

Accuracy assessment sample and population matrices at different hierarchy levels of the USNVC and individual vegetation class (association) user's and producer's accuracies are presented in Tables C-1 through C-10 in Appendix C.

The point estimate for the overall accuracy for association level map classes is 47.2% (Table 8), with a 90% confidence interval for this estimate of 42.8% to 51.6 %. If association level observations are pooled to the thematically coarser respective USNVC levels of alliance, the accuracy improves only slightly (Table 8), but increases significantly at the coarser levels of group, macrogroup, division/formation, and subclass/class level. Table 8 shows the inverse relationship between thematic resolution (number of classified units) and thematic accuracy at various thematic resolution (USNVC hierarchy) levels. Understanding the nature of this relationship at different levels of thematic

resolution can give the map user insight into selection of a map legend that optimizes a desired balance of resolution and accuracy.

Table 8. Numbers of thematic units (vegetation classes) and overall thematic accuracies of SARA vegetation map at various levels of the USNVC hierarchy.

USNVC LEVEL	NUMBER OF MAP CLASSES AT SARA[a]	POINT ESTIMATE OF OVERALL ACCURACY
Association	49	47.2%
Alliance	43	47.8%
Group	19	66.4%
Macrogroup	15	68.2%
Division/Formation	7	86.7%
Subclass/Class	3	91.1%

[a] Mapped classes may be fewer than classified units, since not all classified units are mapped.

The *Kappa* index (Foody 1992), as recommended by the 1994 protocols (ESRI et al. 1994) is less relevant to overall accuracy because it is based on the sample contingency table rather than the population contingency table, and does not account for the stratified design. However, when compared with overall accuracy as calculated from the sample contingency table, it does provide a measure of accounting for increases in mapping difficulty imposed by more classes because it takes into account the increased influence of chance on map accuracy for smaller numbers of classes. In the case of SARA, the overall accuracy estimate as computed by the sample contingency table (i.e., as computed for a simple random, rather than stratified random, design) is 45.2% and the corresponding *Kappa* index is 42.0 %.

Final Vegetation Map Production

Based on the AA sampling data and the final classification of 53 vegetation associations, the association level map was revised to correct errors and create more accurate vegetation association polygon boundaries. In this final revision, AA data, classification plot data, field observations, aerial photography signatures, and topographic maps were used to revise polygon boundaries and attributes. Although these revisions probably increase individual class and map overall accuracy over those rates reported, the thematic accuracy rates reported necessarily are based on the 2006 revised preliminary sample data (map class) assignments of AA observations, to avoid obvious bias and circularity of reporting based on revisions. The reported rates are conservative for the revised map, and they also would be the most accurate representations of expected accuracy conditions of unvisited and unrevised areas of the map.

The resulting final vegetation association map is presented for both park units in Figures 12 and 13, and a summary of the vegetation association distribution and abundance is provided in Table 4. Polygons that were attributed with Anderson Level I and II categories (Anderson et al. 1976) retained their attributes in the final map.

Project Deliverables

Final products of the vegetation mapping project as delivered in 2008 are presented in Table 9. All products were delivered to the NPS by NYNHP with an earlier version of this report. Additional thematic accuracy calculations were performed by NPS and are included in the final report.

Table 9. Summary of products resulting from the vegetation classification and mapping at Saratoga National Historical Park.

Product	FGCD-compliant spatial metadata
Aerial photographs, including flight line map and photoindex	Yes
Photomosaic digital format	Yes
Vegetation classification plot sampling data in the PLOTS 2.0 Database	Not applicable
GPS coordinates of vegetation classification plots	Yes
Thematic AA data in the PLOTS 2.0 Database	Not applicable
GPS coordinates of thematic AA sampling points	Yes
Digital photographs of all classification plots and AA points acquired in the field	Not applicable
Final map of vegetation associations as paper copy and in digital format	Yes
Wetland map as paper and in digital format	Yes
Final report as paper copy and in digital format	Not applicable

Discussion

The SARA vegetation classification and mapping effort provides an effective context for interpreting the vegetation resources in the park and sets a baseline for future research. This project provides the most detailed study to date of the distribution and diversity of plant associations in SARA. As with previous studies in the region, vegetation inventory within SARA demonstrates the exceptional floristic diversity of the Hudson River floodplain, adjacent uplands, and managed lands. This section provides a discussion of the significant floristic resources and plant communities; project limitations; possibilities for improving the classification and map accuracy; and the study's implications for natural resource management, interpretive goals, and future research.

Vegetation Classification and Characterization

This study of SARA classified and characterized 53 USNVC vegetation associations in detail (Appendix F). The diversity and distribution of vegetation associations within SARA units are primarily a result of the following four factors: (1) the geologic history of the region, especially the effect of glaciation; (2) the location along the Hudson River within a temperate climate; (3) diverse topography that includes ravines, high level hills, floodplains, and basin wetlands; and (4) the setting within a rural agricultural landscape with its associated historical and ongoing land use practices.

Early Successional and Human Modified Associations

Of the 53 associations described in this classification (Appendix F),15(18.5%) (Table 10) are successional or modified types that have become established following forest clearing, after the cessation of agricultural activities, from forest plantings, or from the advent of invasive species. These associations account for approximately 63% of the mapped area within park boundaries (Table 10). Furthermore, approximately 41% of SARA is classified as one of the following three successional associations: (1) White Pine Successional Forest (CEGL007944), (2) Northeastern Old Field (CEGL006107) or (3) Early-Successional Woodland/Forest (CEGL006303) (Table 10). The remainder of the map polygons that represent land cover that is heavily influenced by human activity is classified as cover types labeled with Anderson Level I and II land use categories including roads, parking lots, buildings, and vacant lots (Anderson et al. 1976).

A detailed summary of the invasive plant species within these successional types is provided in Canham (2004) and a list of management recommendations for grassland birds was created in Trocki and Paton (2005).

Globally Rare and State Significant Associations

SARA supports several vegetation associations with biodiversity significance at the state and global level. While there are no large examples of globally rare associations within SARA, there are small patches of four associations within SARA unit boundaries considered rare by NatureServe: (1) American Beech – Maple Glaciated Forest – G2G3 (imperiled to vulnerable) (CEGL005013); (2) Hairyfruit Sedge Wetland – G3 (vulnerable) (CEGL006447); (3) Wild Rice Marsh – G3G4 (vulnerable to apparently secure) (CEGL002382); and (4) Shale Talus Slope Woodland – G3G5 (vulnerable to secure) (CEGL006074) (Appendix F).

Table 10. Number of polygons and mapped hectares of successional vegetation associations within Saratoga National Historical Park.

USNVC Vegetation Association	No. of Polygons Within Park Boundary	Mapped Hectares Within Park Boundary	Percent Area Within Park Boundary
Black Locust Successional Forest	3	2.55	<1%
Bracken Grassland	5	4.47	<1%
Early-Successional Woodland/Forest	74	95.46	8%
White Pine Successional Forest	96	261.44	22%
Little Bluestem Old Field	70	82.33	7%
Northeastern Modified Successional Forest	13	26.70	2%
Common Reed Marsh	0	0.00	0%
Norway Spruce Plantation	0	0.00	0%
Northeastern Oak - Red Maple Successional Forest	10	32.80	3%
White Pine Plantation	8	15.85	1%
Northeastern Old Field	107	147.33	13%
Northeastern Successional Shrubland	38	73.93	6%
Purple Loosestrife Wetland	1	0.18	<1%
Reed Canarygrass Eastern Marsh	25	12.38	1%
Steeplebush / Reed Canarygrass Successional Wet Meadow	3	0.48	<1%
Total	453	755.90	63%

Three NYNHP ecological communities within SARA are considered significant occurrences from a statewide perspective: (1) floodplain forest (combination of seven floodplain vegetation associations); (2) vernal pool (Eastern Woodland Vernal Pool association); and (3) successional fern meadow (Bracken Grassland association). These three natural communities and their equivalent USNVC associations are described briefly below.

The floodplain forest established along the Hudson River near Bemis Heights is a very good example and supports a low number of the invasive exotic plant species that are often typical for this community. This is the first significant occurrence of floodplain forest to be surveyed and documented by NYNHP on this reach of the Hudson River north of Troy, NY. Prior to this mapping effort it was thought that very little floodplain forest remained between Fort Edward and Troy and any remaining patches were presumed to be of low quality. The floodplain forests found at SARA are comprised of the following seven floodplain forest associations: (1) Boxelder Floodplain Forest (CEGL005033); (2) Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575); (3) Silver Maple - Elm Floodplain Forest (CEGL006001); (4) Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176); (5) Silver Maple Floodplain Levee Forest (CEGL006147); (6) Swamp White Oak Floodplain Forest (CEGL006386); and (7) Terrace Hardwood Floodplain Forest (CEGL006114). The discovery of a good quality 70-acre (28-ha) floodplain forest within SARA was one of the highlights of the vegetation inventory project and could prompt further searches for more examples up-anddown-river from SARA.

The vernal pool complex near Burgoyne's Headquarters (Stop 8) of the tour road represents a significant occurrence of this unique community (equivalent to Eastern Woodland Vernal Pool - CEGL006453). This complex was observed on aerial imagery and was surveyed in the spring of 2005 after the terrestrial classification plot sampling was complete. The vernal pool occurrence is comprised of several pools of varying size and depth totaling about 2.5 acres (1 ha). This vernal pool complex is characterized by fluctuating water levels as well as the presence of a suite of invertebrate and amphibian species, including fingernail clams, wood frogs, and spotted salamanders. Additional invertebrates include water striders, oligocheate worms, mosquito and midge larvae, and amphipods. Pools range from sparsely vegetated to supporting somewhat dense cover depending on the season and on the degree of overarching tree canopy cover; on average, the vernal pools are nearly 40% unvegetated. This group of vernal pools has been previously surveyed by SARA staff and university researchers (Chris Martin pers. comm).

The successional fern meadow (equivalent to Bracken Grassland - CEGL005142), also located near Burgoyne's Headquarters (Stop 8) of the tour road and depicted on the cover of this report, is rare, representing the second occurrence of this community type documented by NYNHP. The diversity of fern species in this association is impressive; nine fern species occurred in one 10 m x 10 m classification plot, including: (1) cinnamon fern (*Osmunda cinnamomea*); (2) sensitive fern (*Onoclea sensibilis*); (3) eastern marsh fern (*Thelypteris palustris*); (4) common ladyfern (*Athyrium filix-femina*); (5) interrupted fern (*Osmunda claytoniana*); (6) royal fern (*Osmunda regalis*); (7) western brackenfern (*Pteridium aquilinum*); (8) eastern hayscented fern (*Dennstaedtia punctilobula*); and (9) New York fern (*Thelypteris noveboracensis*). The dominant shrub is sweet fern (*Comptonia pergrina*) which further enhances the fern-dominance of this unique and rare association. While NYNHP places successional communities at a lower conservation priority, this occurrence within SARA is a very good quality example and is likely uncommon/rare for this part of NY. In addition, this is primarily a fire-maintained community and in the future there will likely be fewer successional fern meadow sites without prescribed fire to ensure their long term viability.

Fire-maintained Associations

At least three associations are maintained by fire as prescribed in the SARA Fire Management Plan (USDI NPS 2003), they are: (1) successional fern meadow (or Bracken Grassland CEGL005142); (2) Little Bluestem Old Field (CEGL006333); and (3) Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571). While SARA staff use fire to maintain other vegetation associations, such as Northeastern Old Field (CEGL006107) and Northeastern Successional Shrubland (CEGL006451), these herbaceous types can also be maintained via mowing and herbicide application and are not as fire-dependent as are the three associations addressed in the SARA Fire Management Plan. A summary of grassland bird management recommendations for SARA units (includes prescribed burning) is included in Trocki and Paton (2005).

Wetland Maps

An additional component of this vegetation mapping project was the production ofwetland maps for SARA. All vegetation association polygons were labeled with Cowardin's Systems (e.g., Palustrine; Cowardin et al. 1979) and Subsystems (e.g., Emergent Wetland) based on their placement (e.g.,

terrestrial, palustrine, lacustrine) in the Ecological Communities of New York State (Edinger et al. 2002). Figures 14 and 15 depict the palustrine associations found within SARA. These maps are intended to supplement the previously completed Wetlands Inventory of Saratoga National Historical Park (Tiner et al. 2000). A comparison of these wetland association maps with National Wetland Inventory maps (NWI) is recommended. These wetland maps are not intended to replace existing federal and state regulatory wetland maps.

Accuracy Assessment

Errors in the vegetation association map were caused by several factors. A large source of error was the discovery of additional associations during AA point sampling. In most cases these types had been classified and mapped as one of several closely related associations that were surveyed during classification plot sampling. In other cases, new communities were discovered during AA sampling. For example, Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575) was not observed during classification plot surveys and was thus not included from the revised preliminary vegetation map. It occurred at 12 AA point locations inside the SARA boundary, and one AA point outside the SARA boundary.

The second largest source of error was the difficulty in distinguishing between vegetation types with very similar aerial photography signatures. For example, several of the deciduous forest associations were misclassified as other deciduous forest associations. All 16 AA points for Northeastern Dry Oak - Hickory Forest (CEGL006336) were misclassified as one or more of eight different associations that were mostly successional forests. Eastern white pine (*Pinus strobus*) is a significant component of five plant associations and a minor component of several other associations within SARA. The aerial photography signature for the Eastern white pine-dominated associations looks very similar, which likelyexplains why these types were often misclassified. White Pine - Oak Forest (CEGL006293) was used as a catch-all for these similar types and was assigned to 14 polygons on the draft vegetation map that were assessed by AA sampling. It was only present at two of the points; the remaining 12 AA points belonged to 9 different associations.

Inclusions of vegetation patches and small stands within larger polygons (embedded vegetation associations that met the minimum mapping unit) accounted for widespread error. In these cases, a polygon was mapped as one prevalent vegetation association, but the AA point randomly fell into a small, unmapped included association. For example, mapped patches of the Northeastern Old Field association (CEGL006107) often contained small patches of Northeastern Successional Shrubland (CEGL006451). These inclusions were not apparent on the old aerial imagery that was used to produce the draft map, likely because the old fields were being mowed. When mowing practices changed, shrubby patches developed. In most cases, if the embedded association was large enough to meet the project minimum mapping unit and was discernible on the newer aerial photography, then the two types were split on the revised map.

Misclassifications were common across the seven floodplain forest types. Several large floodplain polygons were found to have associations that were often slightly wetter or drier than the mapped association depending on slight changes in elevation that were undetectable on aerial photography signatures. Because of the difficulty in discerning differences between deciduous tree species using

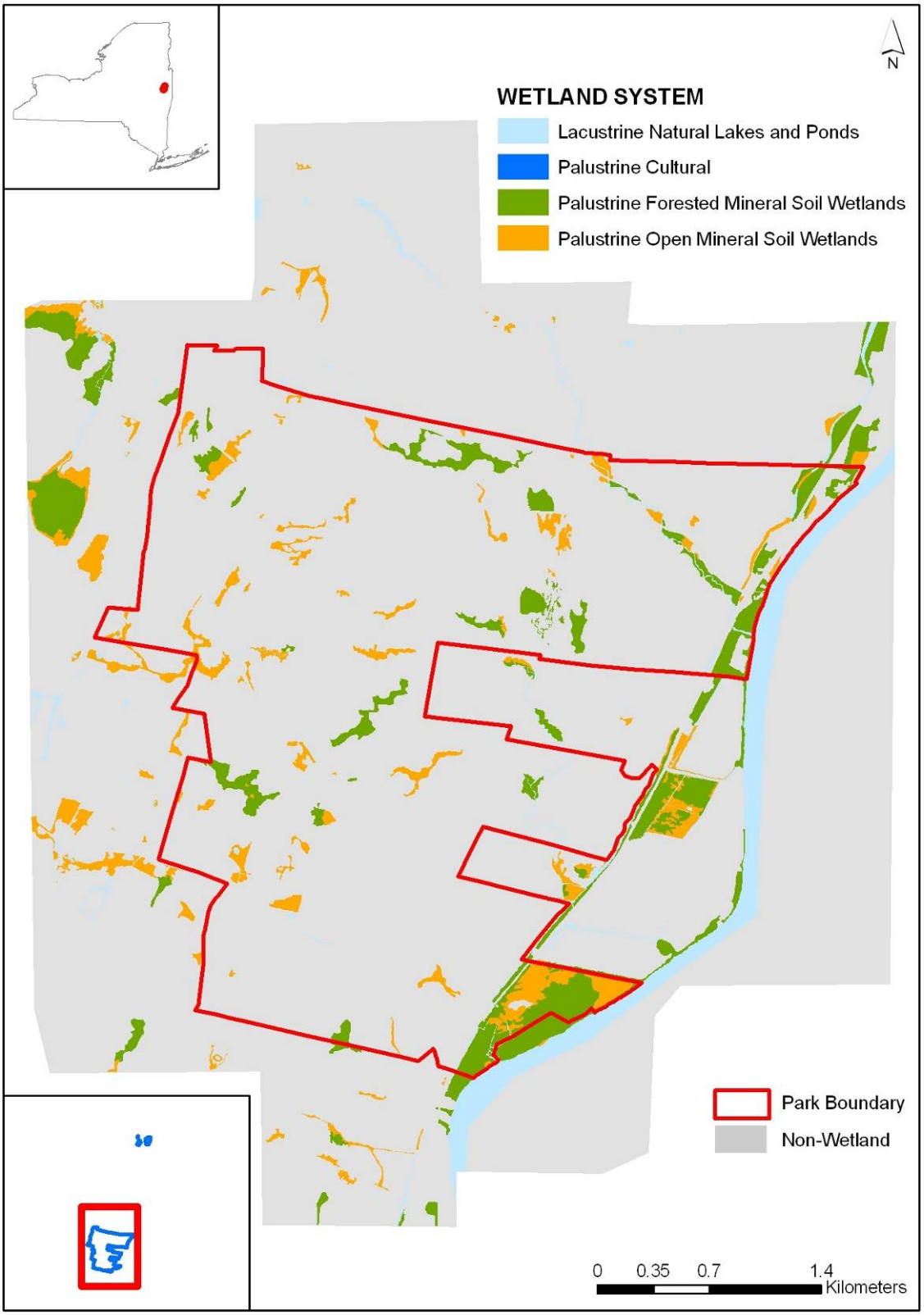


Figure 14. Open and Forested Wetlands of Saratoga National Historical Park in the Battlefield Unit.

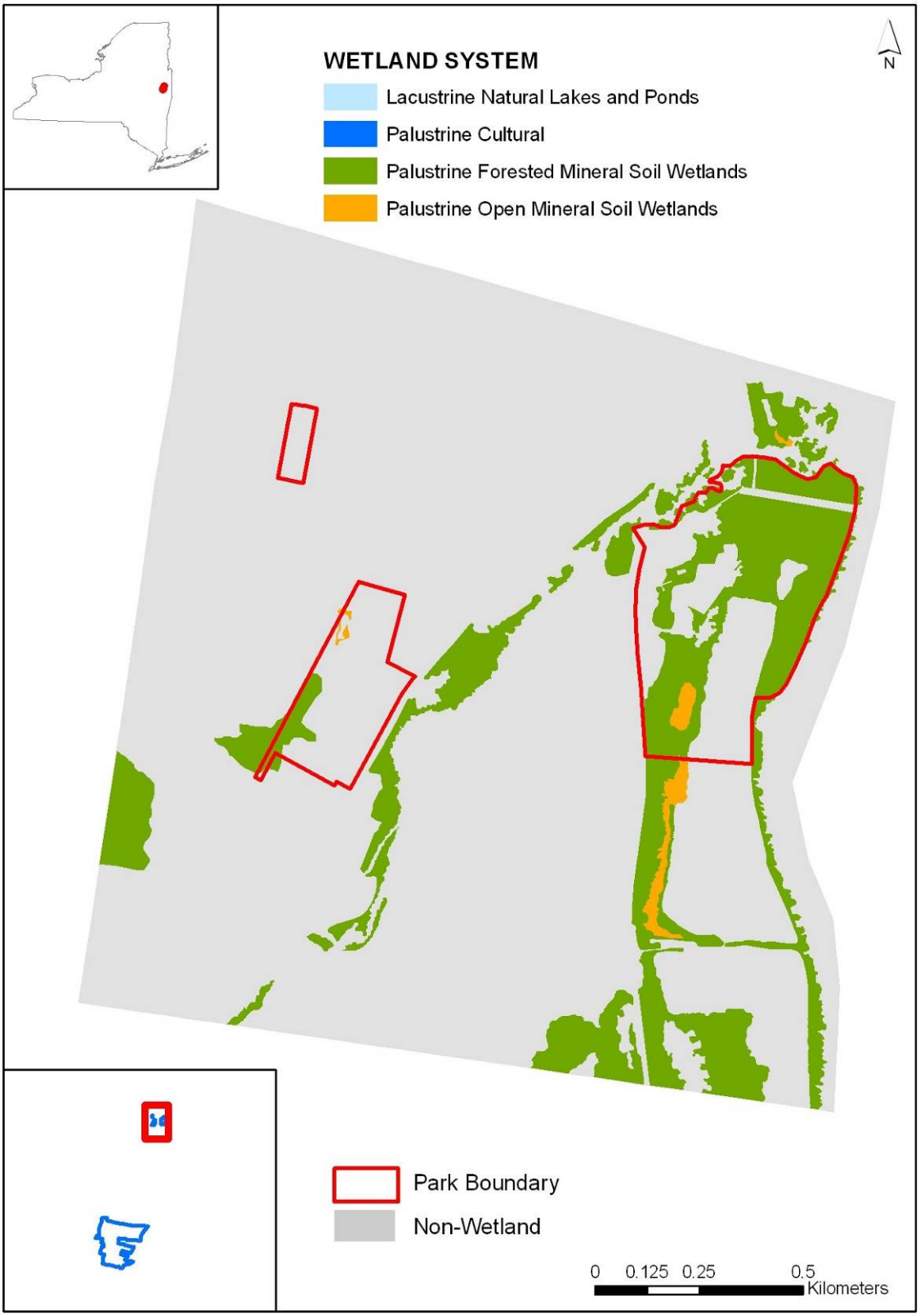


Figure 15. Open and Forested Wetlands of Saratoga National Historical Park in the Old Saratoga Unit.

older aerial imagery, it is not surprising that after AA sampling, six of 14 Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176) polygons were reclassified as Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575).

However, the low AA matches were offset by several types with a high number of matches. Examples with a high number of matches include the Northeastern Old Field (CEGL006107), the White Pine Successional Forest (CEGL007944), and the Little Bluestem Old Field (CEGL006333)-communities with a fairly distinct aerial signature.

Only 231 (53%) of the 438 AA destination points (Figures 10 and 11; Table 4) were accessible and sampled. Within SARA, 227 (81.6%) of the 278 AA destination points were accessed and sampled. Since the AA methodology was designed to assess the entire map, 160 AA destination points fell outside the SARA boundary. Project priorities, however, were the lands managed by NPS within SARA and only four (2.5%) of these 160 AA destination points that were outside of the SARA boundary were accessed and sampled.

Lastly, the thematic AA data were used to correct the 2006 revised preliminary vegetation association map and create the 2014 final vegetation association map (i.e., the USNVC association label of the polygon matched the AA point USNVC association label). Thus, the final vegetation association map (Figures 12 and 13) probably has a significantly higher thematic accuracy than that reported above (i.e., for the 2006 revised preliminary map). Re-assessing the thematic accuracy of the final vegetation association map, however, would require another round of intensive field sampling. The costs of a second round of sampling were not considered justified simply to quantify the level of increased accuracy in the final map.

Natural Resource Concerns

Historic Timber Harvest

A portion of the land in and adjacent to SARA has been variously logged, cleared, and replanted over three centuries. Logging was mostly followed by clearing into pastures, then establishing plantings of Norway spruce, red and white pine, and other tree species. Historically harvested areas are early-, mid-, and late-successional and have a range of size class diversity and understory establishment. Where natural succession is proceeding in plantation forests, the stands may converge with natural forests in composition and structure over time.

The conditions resulting from forest/woodland management activities and subsequent recovery within SARA are highly variable due to the length of time since the activity and different successional trajectories as a function of the intensity of the disturbance, effectiveness of any reforestation efforts, site conditions, current climate, and other factors. Variation in formerly-logged areas could not be fully captured in the vegetation classification and map; however this inventory does provide information about stand composition, structure, and distribution. Such baseline information may prove useful in setting goals and appropriate standards for passive or active restoration of these forests/woodlands if desired. From the perspective of interpretive value to SARA visitors it may be worthwhile to allow some previously logged areas to naturally recover as a demonstration of logging history and the dynamics of forest succession over time.

Non-Native Species

The vegetation database associated with this project contains information on the presence and absence of non-native invasive plant species encountered in the classification and AA plots (also see Appendix D). These data will be very useful as a baseline from which to evaluate changes in the future. In addition, the data could be used to model the types of environments susceptible to non-native/weedy species invasion.

Wildlife Habitat

Although this inventory did not emphasize sampling of detailed wildlife habitat or structural parameters, the delineation of physiognomic classes should aid in analyses of broad patterns in vegetation structural types for use in wildlife monitoring. Vertebrate wildlife species are known to respond foremost to vegetation structure and broad physiognomic classes and this project should inform modeling and mapping efforts for wildlife habitat/use.

Natural Resource Interpretation

This inventory project illustrates the diverse vegetation mosaic that has become established along the Hudson River. It thereby provides a valuable resource for SARA interpretive staff to educate visitors about plant communities and the diverse ecological processes affecting their development and change. Within SARA the vegetation pattern is structured by several physical and biological factors interacting in time and space. The effects of a consistent climatic regime of precipitation and temperature influence vegetation in the entire inventory area and region. The interaction of topography, geology, soils, and precipitation events provides surface water runoff and groundwater that feeds seeps, springs, wetlands, streams, and ultimately the Hudson River.

The forested areas of SARA provide a characteristic regional setting for studying natural and human-caused disturbance dynamics and their implications for native plant and animal diversity. Post-logging succession in particular may be an important interpretive resource; interpretive walks through native and secondary forest stands might provide an ideal showcase to illustrate and communicate 20th century forestry approaches and their outcomes. SARA, in general, provides the opportunity to present the narrative and provide field sites for interpreting the regional climatic, disturbance, and human history of the Hudson River. This vegetation inventory project provides a valuable snapshot of the vegetation types and attributes based on interpretation of aerial imagery and ground sampling from 2003 and 2004 that can be compared to present day conditions.

As stated above, this study provides an in-depth resource for interpretive staff to develop communication programs that describe the complex vegetation mosaic within SARA and the adjacent Hudson River floodplain. In particular, the vegetation association descriptions (Appendix F) and the key to the associations (Appendix E) provide valuable tools to effectively communicate both vegetation classification and distribution patterns. This inventory will also serve as a valuable resource for individuals wanting to quickly gain a comprehensive introduction to the vegetation of SARA and vicinity.

Research Opportunities

The vegetation map and database provide opportunities for research on vegetation-environment relations. The spatial data can be overlaid with the geology and soils mapping to provide additional environmental descriptors for each classification plot location. Ordination techniques relating plot data to environmental data could be applied to pursue vegetation-environment relations. In addition, species richness data could be analyzed for patterns related to vegetation association, elevation, hydrology, disturbance, and other variables. The map data are also useful for wildlife habitat modeling, fire modeling, and as a guide for rare plant surveys, wildlife habitat structural analyses, and invasive exotic species management. Complex interactions between environmental data and the mapped vegetation could be examined and yield important information about vegetation composition, structure, and function and how these elements are affected by elevation, soil, slope aspect, hydrology, and disturbance.

In addition, the dynamics of the various forest canopy structures in SARA could be explored. Research evaluating the habitat these forests provide for native plant and vertebrate diversity could investigate the current microclimate, understory plant diversity, and wildlife habitat values (e.g., land bird, small mammal, and invertebrate diversity). For example, secondary forests could be prioritized for long-term research in forest succession to document the rate and magnitude of change over time. A subset of these forests might also be the focus for restoration efforts to explore the prospects for increasing heterogeneity or to alter current trends of succession through the introduction of prescribed fire or mechanical treatments.

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Appendix A: Saratoga National Historical Park - Photomosaic key attributes

Table A.1. Saratoga National Historical Park - Battlefield Unit photomosaic key attributes

Photomosaic attributes	Metadata
Title of metadata record:	Saratoga National Historical Park Color Infrared Orthorectified Photomosaic; leaf-off; (ERDAS IMAGINE 8.7 .img and MrSID formats)
Publication date of mosaic (from metadata):	September 22, 2004
Date aerial photography was acquired:	April 28, 2003
Vendor that provided aerial photography:	William Frament, USDA Forest Service (Northeastern Area State and Private Forestry, Durham, NH)
Scale of photography:	1:8,000
Type of photography:	Color infrared, stereo pairs
Number of air photos in mosaic:	27 (23 included in the mosaic)
Archive location of air photos, airborne GPS/IMU files and camera calibration certificate:	North Carolina State University, Center for Earth Observation
Scanning specifications:	600 dpi
Horizontal positional accuracy of mosaics:	1.65 meters, meets Class 1 National Map Accuracy Standard
Number of ground control points upon which estimated accuracy is based upon estimated accuracy is based:	38
Method of calculating positional accuracy:	Root mean square error
Archive location of mosaics and metadata:	Northeast Temperate Network, Woodstock, VT
Format(s) of archived mosaics:	.img (uncompressed) and MrSID (20:1 compression)

Table A.2. Saratoga National Historical Park - Old Saratoga Unit orthophotography key attributes

Orhophotography attributes	Metadata
Title of metadata record:	Digital Orthophotography Project of Saratoga National Historical Park, 2000
Publication date of orthophotography (from metadata):	November 8, 2000
Date aerial photography was acquired:	May 3, 2000
Vendor that provided aerial photography:	Chas. H. Sells, Inc. (90 Worcester Road, Charlton, MA 01507)
Scale of photography:	1:12,000
Type of photography:	True color
Scanning specifications:	25 microns (1016 DPI)
Horizontal positional accuracy of mosaics:	0.91 meters
Number of ground control points upon which estimated accuracy is based upon estimated accuracy is based:	25 (includes Battlefield, Schuyler and Monument units)
Method of calculating positional accuracy:	Root mean square error
Archive location of mosaics and metadata:	Northeast Temperate Network, Woodstock, VT
Format(s) of archived mosaics:	TIFF

Appendix B: NY Natural Heritage Vegetation Plot Form and Hand-Held DataBase (HHDB) Screen Shots

COMMUNITY FORM 3: QUANTITATIVE COMMUNITY CHARACTERIZATION revised May 10, 2001

NY Natural Heritage Program

Reviewed by NY Natural Heritage Program: Date:____ Initials: _____

A. IDENTIFIERS / LOCATION (GENERAL EOR INFORMATION)

1. Survey site name:_____

2. Quad code(s):_____

3. Quad name(s): _____

4. County name(s):_____5. Town:_____

6. Directions to this transect:_____

_____

_____

7. Sourcecode:_____ 8. Survey date:_____9. State:

10. Surveyors:_____

B. ENVIRONMENTAL DESCRIPTION

11. **Community name** _____

12. National Association_____

13. Transect/observation point #

14. Image annotation #

15. Elevation:

16. Topographic position:
__Interfluve __Toeslope
__High slope __Low level
__High level __Channel wall
__Midslope __Channel bed
__Backslope __Basin floor
__Step in slope __Other:
__Lowslope

17. Topographic sketch (show where plot is located within surrounding topography):

18. Slope degrees:_____

19. Slope aspect:_____

20. Parent material/bedrock:

21. Soil profile description: note depth, texture, and color of each horizon. Note significant changes such as depth to mottling, depth to water table, root penetration depth

22. Organic horizon depth:_____

23. Organic horizon type: Mor:__ Mull:___

24. Average pH of mineral soil:_____

25. Soil moisture regime:
__Extremely dry __Very dry
__Dry __Well drained
__Somewhat moist __Moist
__Somewhat wet __Wet
__Permanently inundated __Very wet
__Periodically inundated
Soil pore salinity_____ppt. (optional)

26.Soil drainage:
__Rapidly drained
__Well drained
__Moderately well drained
__Somewhat poorly drained
__Poorly drained
__Very poorly drained

27. Hydrologic Regime of plot (adapted from Cowardin 1979):
__Semipermanently flooded __Intermittently flooded
__Seasonally flooded __Permanently flooded
__Saturated __Tidally flooded
__Temporarily flooded __Unknown
__Never Inundated

Optional fields below
pH of water_____
Flood depth_____
Tidal range_____

28. Stoniness:
__Stone free <0.1%
__Moderately stony 0.1-1%
__Stony 3-15%
__Very stony 15-50%
__Exceedingly stony 50-90%
__Stone piles >90%

29. Average mineral soil texture (Brewer 1982):
___ sand ___ loamy sand
___ loam ___ sandy loam
___ silt loam ___ sandy clay loam
___ clay loam ___ silty clay loam
___ silt ___ sandy clay
___ clay ___ silty clay

30. Average organic soil texture:
___muck
___peat

Von Post scale of peat decomposition:_____
pH of peat:_____

31.Unvegetated surface (total):_____%
___% Bedrock ___% Litter, duff
___% Large rocks (>10cm) ___% Wood >1cm
___% Small rocks (0.2-10cm) ___% Water
___% Sand (0.1-2mm) ___% Other:
___% Bare soil

32. Environmental Comments: Note homogeneity of vegetation, evidence of erosion/sedimentation, further observations of inundation, etc._____

_____

_____

_____

_____

33. Plot representativeness:_____

_____

_____

_____

_____

C. VEGETATION

Community name:_____

34. System:___Terrestrial ___Palustrine ____Estuarine 35. Plot number:_____ 36. Plot dimensions:_____

37. Leaf type:
(of dominant stratum)
___Broad-leaf
___Semi-broad-leaf
___Mixed broad-needle leaf
___Semi-needle-leaf
___Needle-leaf
___Graminoid
___Broad-leaf herbaceous
___Pteridophyte
___Non-vascular

38. Leaf phenology:
(of dominant stratum)
___Forest
___Semi-deciduous
___Mixed deciduous-evergreen
___Semi-evergreen
___Evergreen
___Perennial
___Annual

39. Physiognomic type:
___Woodland
___Sparse woodland
___Shrubland
___Sparse shrubland
___Dwarf shrubland
___Sparse dwarf shrubland
___Herbaceous
___Sparsely vegetated
___Non-vegetated

40. Strata/life forms	%cover	height
T1 Emergent tree (>5m)		
T2 Tree canopy (>5m)		
T3 Tree sub-canopy (>5m)		
S1 Tall shrub (2m - 5m)		
S2 Short shrub (< 2m)		
V Vine/liana		
H Herbaceous		
N Non-vascular		
E Epiphyte		
A1 Emergent aquatic		
A2 Floating-leaved aquatic		
A3 Submerged aquatic		

41. Species/percent cover: starting with the uppermost stratum, list all species and % cover for each in the stratum. For forests and woodlands, list the DBH of all trees over 10 cm diameter on a separate line below each tree species. Separate the measurements with a comma and note whether in cm or inches. Estimate number of fauna.

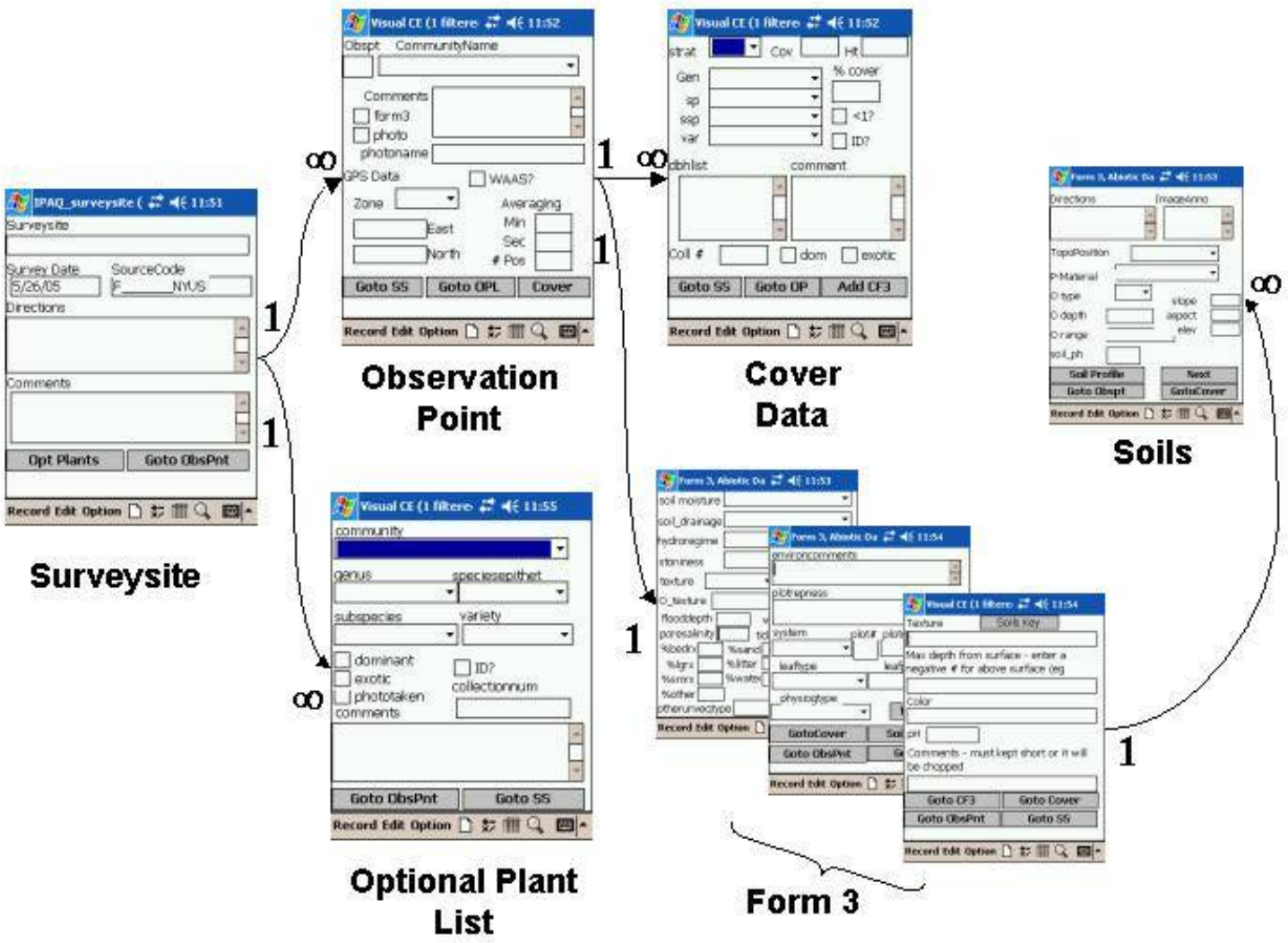


Figure B.1. Screen shots of NY Natural Heritage Hand-Held DataBase (HHDB). Vegetation plot data and accuracy assessment point data were digitally collected in the field using this software.

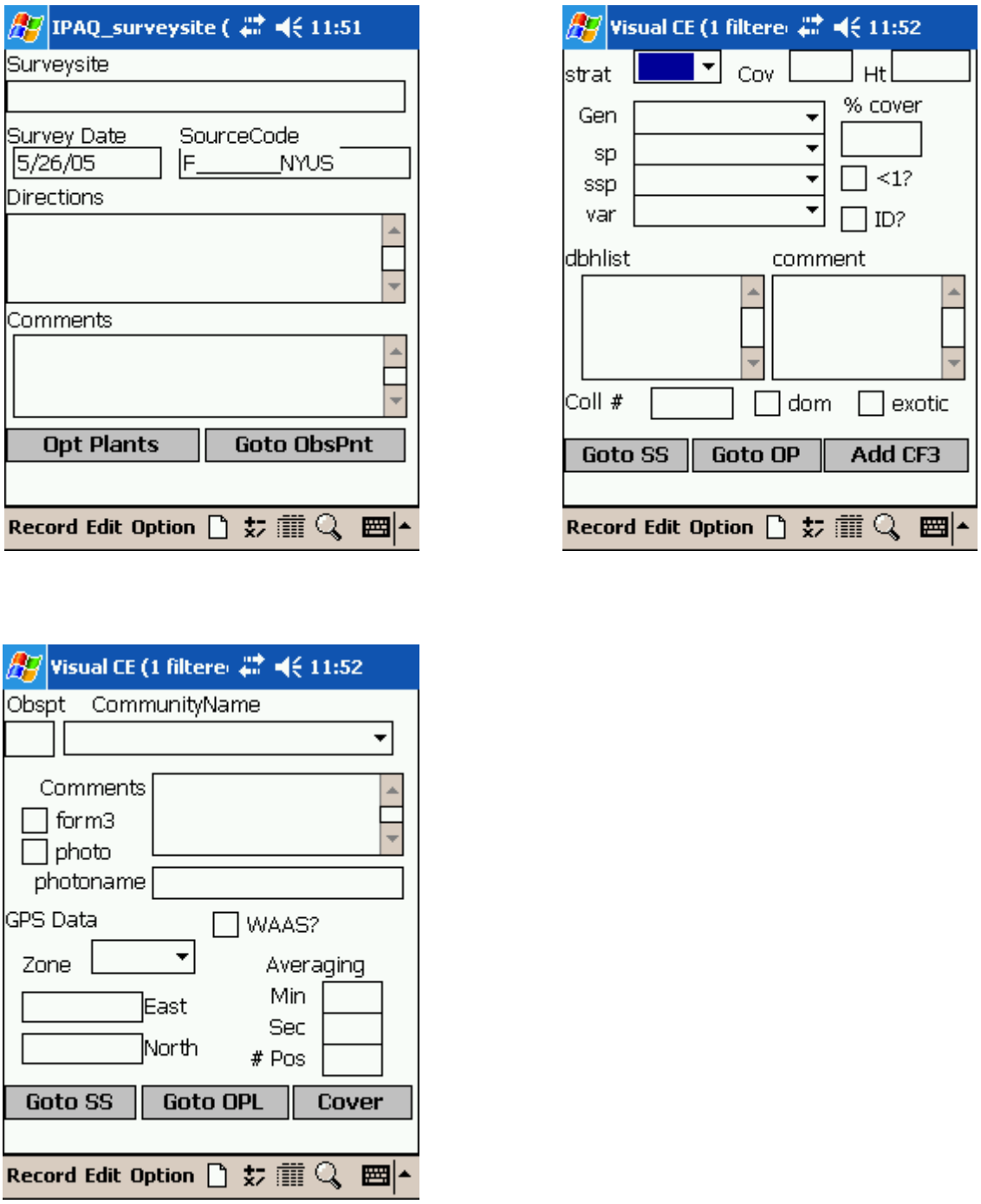


Figure B.2. Screen shots of NY Natural Heritage Hand-Held DataBase (HHDB). Survey site information, plot and point spatial data, and vegetation cover data were digitally collected in the field using this software.

Appendix B: NY Natural Heritage Vegetation Plot Form and Hand-Held DataBase (HHDB) Screen Shots (continued)

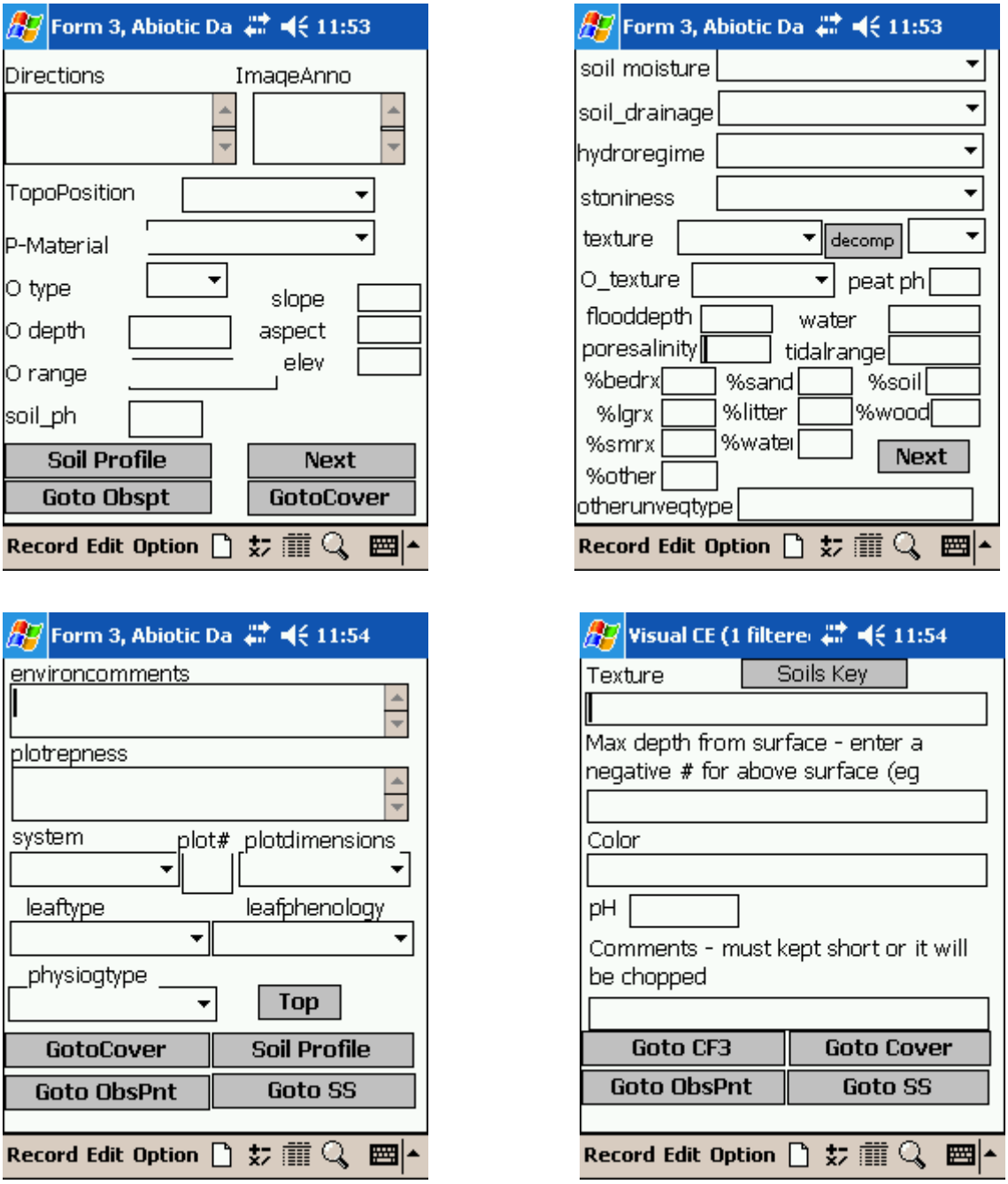


Figure B.3. Screen shots of NY Natural Heritage Hand-Held DataBase (HHDB). Data on the physical characteristics and soils for plots were digitally collected in the field using this software

Appendix C. Thematic Accuracy Assessment Contingency Tables

This appendix displays sample and population contingency tables (see Lea and Curtis (2010) for more explanation) for the thematic accuracy assessemt at SARA at the USNVC levels of association, alliance, group, macrogroup, division (1:1 with USNVC formation at SARA) and subclass (1:1 with USNVC class at SARA). Tables that represent the intermediate step of weighting the association level sample counts in order to account for polygon stratification (described in text) are not included in this appendix, but are included in project accuracy assessment spreadsheets (part of associated data).

Table C-1. Sample (raw counts) contingency table at USNVC Association Level, Saratoga National Historical Park.

	Shale Talus Slope Woodland (CEGL006074)	Northeastern Dry Oak-Hickory Forest (CEGL006336)	Dry, Rich Oak - Hickory Forest (CEGL006301)	Upland/Wetland Transitional Forest (CEGL006000)	Black Locust Successional Forest (CEGL007279)	Early-Successional Woodland/Forest (CEGL006303)	White Pine Successional Forest (CEGL007944)	Northeastern Oak - Red Maple Successional Forest (CEGL006506)	Northeastern Modified Successional Forest (CEGL006599)	White Pine Plantation (CEGL007178)	Hemlock - Beech - Oak Forest (CEGL006088)	Hemlock - Northern Hardwood Forest (CEGL006109)	White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	White Pine - Oak Forest (CEGL006293)	Northern Hardwood - White Pine Forest (CEGL005005)	Northern Red Oak - Northern Hardwood Forest (CEGL006173)	Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)	Semi-rich Northern Hardwood Forest (CEGL006211)	Beech - Maple Glaciated Forest (CEGL005013)	Boxelder Floodplain Forest (CEGL005033)	Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)	Silver Maple - Elm Floodplain Forest (CEGL006001)	Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)	Silver Maple Floodplain Levee Forest (CEGL006147)	Terrace Hardwood Floodplain Forest (CEGL006114)	Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	Southern New England Red Maple Seepage Swamp (CEGL006406)	Swamp White Oak Floodplain Forest (CEGL006386)	Bracken Grassland (CEGL005142)	Little Bluestem Old Field (CEGL006333)	Northeastern Old Field (CEGL006107)	Northeastern Successional Shrubland (CEGL006451)	Eastern Woodland Vernal Pool (CEGL006453)	Skunk Cabbage - Jewelweed Seep (CEGL006567)	Mixed Forb Marsh (CEGL006446)	Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)	Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)	Woolgrass Marsh (CEGL006349)	Eastern Cattail Marsh (CEGL006153)	Northeastern Leafy Forb Marsh (CEGL006191)	Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)	Common Buttonbush Shrub Swamp (CEGL006069)	Speckled Alder Swamp (CEGL002381)	Common Reed Marsh (CEGL004141)	Purple Loosestrife Wetland (CEGL006403)	Reed Canarygrass Eastern Marsh (CEGL006044)	Hairyfruit Sedge Wetland (CEGL006447)	Temperate Shale Cliffs and Talus (CEGL006535)	ROW TOTAL (n_r)
Shale Talus Slope Woodland (CEGL006074)																																																**0**
Northeastern Dry Oak-Hickory Forest (CEGL006336)			2	1		3	1	3	3								2											1						1														**16**
Dry, Rich Oak - Hickory Forest (CEGL006301)						1												2										1								1												**5**
Upland/Wetland Transitional Forest (CEGL006000)																																																**0**
Black Locust Successional Forest (CEGL007279)									1																																							**1**
Early-Successional Woodland/Forest (CEGL006303)			2			1			3																								1			1											**8**
White Pine Successional Forest (CEGL007944)							16		1																																							**17**
Northeastern Oak - Red Maple Successional Forest (CEGL006506)																																																**0**
Northeastern Modified Successional Forest (CEGL006599)						1									1						2			2				1																				**7**
White Pine Plantation (CEGL007178)							3			2																																							**5**
Hemlock - Beech - Oak Forest (CEGL006088)			1				3				6		3					2																														**15**
Hemlock - Northern Hardwood Forest (CEGL006109)																																																	**0**
White Pine - Hemlock Dry-Mesic Forest (CEGL006328)																																																	**0**
White Pine - Oak Forest (CEGL006293)			1				4		1		1	1		2	1	1	1																															**14**
Northern Hardwood - White Pine Forest (CEGL005005)																																																	**0**
Northern Red Oak - Northern Hardwood Forest (CEGL006173)		1				1										1		1																															**4**
Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)																																																	**0**
Semi-rich Northern Hardwood Forest (CEGL006211)			1															1																															**2**
Beech - Maple Glaciated Forest (CEGL005013)																																																	**0**
Boxelder Floodplain Forest (CEGL005033)																				1	2							1																				**4**
Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)																																																	**1**
Silver Maple - Elm Floodplain Forest (CEGL006001)																					1		3																										**5**
Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)																				5		5																										**10**
Silver Maple Floodplain Levee Forest (CEGL006147)																							1																										**1**

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-1. Sample (raw counts) contingency table at USNVC Association Level, Saratoga National Historical Park (continued).

	Shale Talus Slope Woodland (CEGL006074)	Northeastern Dry Oak-Hickory Forest (CEGL006336)	Dry, Rich Oak - Hickory Forest (CEGL006301)	Upland/Wetland Transitional Forest (CEGL006000)	Black Locust Successional Forest (CEGL007279)	Early-Successional Woodland/Forest (CEGL006303)	White Pine Successional Forest (CEGL007944)	Northeastern Oak - Red Maple Successional Forest (CEGL006506)	Northeastern Modified Successional Forest (CEGL006599)	White Pine Plantation (CEGL007178)	Hemlock - Beech - Oak Forest (CEGL006088)	Hemlock - Northern Hardwood Forest (CEGL006109)	White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	White Pine - Oak Forest (CEGL006293)	Northern Hardwood - White Pine Forest (CEGL005005)	Northern Red Oak - Northern Hardwood Forest (CEGL006173)	Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)	Semi-rich Northern Hardwood Forest (CEGL006211)	Beech - Maple Glaciated Forest (CEGL005013)	Boxelder Floodplain Forest (CEGL005033)	Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)	Silver Maple - Elm Floodplain Forest (CEGL006001)	Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)	Silver Maple Floodplain Levee Forest (CEGL006147)	Terrace Hardwood Floodplain Forest (CEGL006114)	Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	Southern New England Red Maple Seepage Swamp (CEGL006406)	Swamp White Oak Floodplain Forest (CEGL006386)	Bracken Grassland (CEGL005142)	Little Bluestem Old Field (CEGL006333)	Northeastern Old Field (CEGL006107)	Northeastern Successional Shrubland (CEGL006451)	Eastern Woodland Vernal Pool (CEGL006453)	Skunk Cabbage - Jewelweed Seep (CEGL006567)	Mixed Forb Marsh (CEGL006446)	Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)	Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)	Woolgrass Marsh (CEGL006349)	Eastern Cattail Marsh (CEGL006153)	Northeastern Leafy Forb Marsh (CEGL006191)	Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)	Common Buttonbush Shrub Swamp (CEGL006069)	Speckled Alder Swamp (CEGL002381)	Common Reed Marsh (CEGL004141)	Purple Loosestrife Wetland (CEGL006403)	Reed Canarygrass Eastern Marsh (CEGL006044)	Hairyfruit Sedge Wetland (CEGL006447)	Temperate Shale Cliffs and Talus (CEGL006535)	**ROW TOTAL (n_{i+})**
Terrace Hardwood Floodplain Forest (CEGL006114)																					1																					1				**2**
Elm - Ash / Skunk Cabbage Swamp (CEGL006966)																										1																						**1**
Red Maple - Lake Sedge Wooded Marsh (CEGL006105)								1																																								**1**
Southern New England Red Maple Seepage Swamp (CEGL006406)									1																														1									**3**
Swamp White Oak Floodplain Forest (CEGL006386)																															1																**1**
Bracken Grassland (CEGL005142)																																5																**5**
Little Bluestem Old Field (CEGL006333)																																	12	7	2								1			1				**23**
Northeastern Old Field (CEGL006107)																																		28	2			2		1							1			**34**
Northeastern Successional Shrubland (CEGL006451)							1		1											1															7				1										**11**
Eastern Woodland Vernal Pool (CEGL006453)		1																																	4														**5**
Skunk Cabbage - Jewelweed Seep (CEGL006567)			1																																														**1**
Mixed Forb Marsh (CEGL006446)																																					3												**3**
Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)																																																	**0**
Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)																																	1													2				**3**
Woolgrass Marsh (CEGL006349)																																	1										1	3						**5**
Eastern Cattail Marsh (CEGL006153)						1																															2								2	1			**6**
Northeastern Leafy Forb Marsh (CEGL006191)																																																		**2**
Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)																																																		**0**
Common Buttonbush Shrub Swamp (CEGL006069)																																																		**2**
Speckled Alder Swamp (CEGL002381)																										1																								**1**
Common Reed Marsh (CEGL004141)																																																		**0**
Purple Loosestrife Wetland (CEGL006403)																																																		**0**
Reed Canarygrass Eastern Marsh (CEGL006044)																						1		1																											**4**
Hairyfruit Sedge Wetland (CEGL006447)																				1																															**2**
Temperate Shale Cliffs and Talus (CEGL006535)	1																																																		**1**
COLUMN TOTAL (n_{+j})	**1**	**2**	**8**	**1**	**0**	**8**	**28**	**4**	**11**	**2**	**7**	**1**	**3**	**2**	**2**	**2**	**3**	**6**	**1**	**2**	**12**	**0**	**10**	**2**	**0**	**1**	**1**	**0**	**4**	**5**	**13**	**36**	**13**	**4**	**0**	**9**	**1**	**2**	**4**	**0**	**2**	**1**	**4**	**1**	**1**	**1**	**8**	**2**	**0**	**231**

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-2. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Association Level, Saratoga National Historical Park.

Overall accuracy = 47.2%.	**Shale Talus Slope Woodland (CEGL006074)**	**Northeastern Dry Oak-Hickory Forest (CEGL006336)**	**Dry, Rich Oak - Hickory Forest (CEGL006301)**	**Upland/Wetland Transitional Forest (CEGL006000)**	**Black Locust Successional Forest (CEGL007279)**	**Early-Successional Woodland/Forest (CEGL006303)**	**White Pine Successional Forest (CEGL007944)**	**Northeastern Oak - Red Maple Successional Forest (CEGL006506)**	**Northeastern Modified Successional Forest (CEGL006599)**	**White Pine Plantation (CEGL007178)**	**Hemlock - Beech - Oak Forest (CEGL006088)**	**Hemlock - Northern Hardwood Forest (CEGL006109)**	**White Pine - Hemlock Dry-Mesic Forest (CEGL006328)**	**White Pine - Oak Forest (CEGL006293)**	**Northern Hardwood - White Pine Forest (CEGL005005)**	**Northern Red Oak - Northern Hardwood Forest (CEGL006173)**	**Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)**	**Semi-rich Northern Hardwood Forest (CEGL006211)**	**Beech - Maple Glaciated Forest (CEGL005013)**	**Boxelder Floodplain Forest (CEGL005033)**	**Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)**	**Silver Maple - Elm Floodplain Forest (CEGL006001)**	**Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)**	**Silver Maple Floodplain Levee Forest (CEGL006147)**	**Terrace Hardwood Floodplain Forest (CEGL006114)**	**Elm - Ash / Skunk Cabbage Swamp (CEGL006966)**	**Red Maple - Lake Sedge Wooded Marsh (CEGL006105)**	**Southern New England Red Maple Seepage Swamp (CEGL006406)**	**Swamp White Oak Floodplain Forest (CEGL006386)**	**Bracken Grassland (CEGL005142)**	**Little Bluestem Old Field (CEGL006333)**	**Northeastern Old Field (CEGL006107)**	**Northeastern Successional Shrubland (CEGL006451)**	**Eastern Woodland Vernal Pool (CEGL006453)**	**Skunk Cabbage - Jewelweed Seep (CEGL006567)**	**Mixed Forb Marsh (CEGL006446)**	**Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)**	**Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)**	**Woolgrass Marsh (CEGL006349)**	**Eastern Cattail Marsh (CEGL006153)**	**Northeastern Leafy Forb Marsh (CEGL006191)**	**Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)**	**Common Buttonbush Shrub Swamp (CEGL006069)**	**Speckled Alder Swamp (CEGL002381)**	**Common Reed Marsh (CEGL004141)**	**Purple Loosestrife Wetland (CEGL006403)**	**Reed Canarygrass Eastern Marsh (CEGL006044)**	**Hairyfruit Sedge Wetland (CEGL006447)**	**Temperate Shale Cliffs and Talus (CEGL006535)**	**USERS' ACCURACY ($P_{i=j=x}$)**
Shale Talus Slope Woodland (CEGL006074)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Northeastern Dry Oak-Hickory Forest (CEGL006336)	0.0000	0.0000	0.0038	0.0053	0.0000	0.0158	0.0023	0.0022	0.0171	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Dry, Rich Oak - Hickory Forest (CEGL006301)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0316	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Upland/Wetland Transitional Forest (CEGL006000)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Black Locust Successional Forest (CEGL007279)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Early-Successional Woodland/Forest (CEGL006303)	0.0000	0.0000	0.0075	0.0000	0.0000	0.0298	0.0000	0.0000	0.0754	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0189	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**22.5%**
White Pine Successional Forest (CEGL007944)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2338	0.0000	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**99.1%**
Northeastern Oak - Red Maple Successional Forest (CEGL006506)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Northeastern Modified Successional Forest (CEGL006599)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0090	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0179	0.0000	0.0000	0.0000	0.0000	0.0000	0.0038	0.0000	0.0000	0.0139	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
White Pine Plantation (CEGL007178)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0116	0.0000	0.0000	0.0044	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**27.4%**
Hemlock - Beech - Oak Forest (CEGL006088)	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0043	0.0000	0.0000	0.0000	0.0079	0.0000	0.0080	0.0000	0.0000	0.0000	0.0000	0.0057	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**28.7%**
Hemlock - Northern Hardwood Forest (CEGL006109)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
White Pine - Oak Forest (CEGL006293)	0.0000	0.0000	0.0012	0.0000	0.0000	0.0000	0.0138	0.0000	0.0121	0.0000	0.0009	0.0136	0.0000	0.0119	0.0120	0.0059	0.0019	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	**15.7%**
Northern Hardwood - White Pine Forest (CEGL005005)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Northern Red Oak - Northern Hardwood Forest (CEGL006173)	0.0000	0.0197	0.0000	0.0000	0.0000	0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0156	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**33.9%**
Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Semi-rich Northern Hardwood Forest (CEGL006211)	0.0000	0.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**12.2%**
Beech - Maple Glaciated Forest (CEGL005013)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Boxelder Floodplain Forest (CEGL005033)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**12.1%**
Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Silver Maple - Elm Floodplain Forest (CEGL006001)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	**0.0%**
Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0049	0.0000	0.0054	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**52.7%**
Silver Maple Floodplain Levee Forest (CEGL006147)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0035	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Terrace Hardwood Floodplain Forest (CEGL006114)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	**0.0%**
Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Southern New England Red Maple Seepage Swamp	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0084	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000	**0.0%**

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-2. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Association Level, Saratoga National Historical Park. (continued).

Overall accuracy = 47.2%.	Shale Talus Slope Woodland (CEGL006074)	Northeastern Dry Oak-Hickory Forest (CEGL006336)	Dry, Rich Oak - Hickory Forest (CEGL006301)	Upland/Wetland Transitional Forest (CEGL006000)	Black Locust Successional Forest (CEGL007279)	Early-Successional Woodland/Forest (CEGL006303)	White Pine Successional Forest (CEGL007944)	Northeastern Oak - Red Maple Successional Forest (CEGL006506)	Northeastern Modified Successional Forest (CEGL006599)	White Pine Plantation (CEGL007178)	Hemlock - Beech - Oak Forest (CEGL006088)	Hemlock - Northern Hardwood Forest (CEGL006109)	White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	White Pine - Oak Forest (CEGL006293)	Northern Hardwood - White Pine Forest (CEGL005005)	Northern Red Oak - Northern Hardwood Forest (CEGL006173)	Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)	Semi-rich Northern Hardwood Forest (CEGL006211)	Beech - Maple Glaciated Forest (CEGL005013)	Boxelder Floodplain Forest (CEGL005033)	Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)	Silver Maple - Elm Floodplain Forest (CEGL006001)	Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176)	Silver Maple Floodplain Levee Forest (CEGL006147)	Terrace Hardwood Floodplain Forest (CEGL006114)	Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	Southern New England Red Maple Seepage Swamp (CEGL006406)	Swamp White Oak Floodplain Forest (CEGL006386)	Bracken Grassland (CEGL005142)	Little Bluestem Old Field (CEGL006333)	Northeastern Old Field (CEGL006107)	Northeastern Successional Shrubland (CEGL006451)	Eastern Woodland Vernal Pool (CEGL006453)	Skunk Cabbage - Jewelweed Seep (CEGL006567)	Mixed Forb Marsh (CEGL006446)	Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)	Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)	Woolgrass Marsh (CEGL006349)	Eastern Cattail Marsh (CEGL006153)	Northeastern Leafy Forb Marsh (CEGL006191)	Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)	Common Buttonbush Shrub Swamp (CEGL006069)	Speckled Alder Swamp (CEGL002381)	Common Reed Marsh (CEGL004141)	Purple Loosestrife Wetland (CEGL006403)	Reed Canarygrass Eastern Marsh (CEGL006044)	Hairyfruit Sedge Wetland (CEGL006447)	Temperate Shale Cliffs and Talus (CEGL006535)	**USERS' ACCURACY ($P_{j=Xj=X}$)**
(CEGL006406)																																																	
Swamp White Oak Floodplain Forest (CEGL006386)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Bracken Grassland (CEGL005142)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Little Bluestem Old Field (CEGL006333)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0288	0.0213	0.0034	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0001	0.0000	0.0000	**53.6%**
Northeastern Old Field (CEGL006107)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.1008	0.0019	0.0000	0.0000	0.0062	0.0000	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	**88.7%**
Northeastern Successional Shrubland (CEGL006451)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0000	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0286	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0142	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**30.3%**
Eastern Woodland Vernal Pool (CEGL006453)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**92.3%**
Skunk Cabbage - Jewelweed Seep (CEGL006567)	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Mixed Forb Marsh (CEGL006446)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0053	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0003	0.0000	0.0000	**0.0%**
Woolgrass Marsh (CEGL006349)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000	0.0000	0.0000	0.0000	**73.7%**
Eastern Cattail Marsh (CEGL006153)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0087	0.0000	**0.0%**
Northeastern Leafy Forb Marsh (CEGL006191)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Common Buttonbush Shrub Swamp (CEGL006069)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Speckled Alder Swamp (CEGL002381)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Common Reed Marsh (CEGL004141)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Purple Loosestrife Wetland (CEGL006403)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Reed Canarygrass Eastern Marsh (CEGL006044)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000	**76.2%**
Hairyfruit Sedge Wetland (CEGL006447)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	**60.1%**
Temperate Shale Cliffs and Talus (CEGL006535)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
PRODUCERS' ACCURACY ($P_{i=Yj=Y}$)	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**44.9%**	**86.9%**	**0.0%**	**0.0%**	**100.0%**	**89.8%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**72.5%**	**0.0%**	**1.9%**	**0.0%**	**51.9%**	**0.0%**	**0.0%**	**46.6%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**	**34.6%**	**100.0%**	**98.3%**	**82.5%**	**26.9%**	**100.0%**	**0.0%**	**26.9%**	**0.0%**	**0.0%**	**39.2%**	**0.0%**	**0.0%**	**0.0%**	**29.5%**	**0.0%**	**0.0%**	**0.0%**	**28.4%**	**2.6%**	**0.0%**	

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-3. Sample (raw counts) contingency table at USNVC Alliance Level, Saratoga National Historical Park.

	Northern Red Oak - Chestnut Oak Woodland Alliance	White Oak - (Northern Red Oak, Hickory species) Forest Alliance	(Pignut Hickory, Shagbark Hickory) - White Ash – (White Oak, Northern Red Oak) Forest Alliance	Northern Red Oak - (Sugar Maple) Forest Alliance	Black Locust Forest Alliance	Quaking Aspen Woodland Alliance	Eastern White Pine Forest Alliance	Black Cherry - Red Maple - Canadian Serviceberry – Oak species Forest Alliance	Eastern White Pine Planted Forest Alliance	Eastern Hemlock - Yellow Birch Forest Alliance	Eastern White Pine - Eastern Hemlock Forest Alliance	Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance	Eastern White Pine - Sugar Maple Forest Alliance	Sugar Maple - White Ash - American Basswood Forest Alliance	Sugar Maple - White Ash - American Basswood Forest Alliance	Box-elder Temporarily Flooded Forest Alliance	Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance	(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance	Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance	Red Maple - Green Ash Seasonally Flooded Forest Alliance	Red Maple Seasonally Flooded Woodland Alliance	Red Maple - Green Ash Saturated Forest Alliance	Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance	Bracken Fern - Kalm's Brome Herbaceous Alliance	Broomsedge Bluestem Herbaceous Alliance	Orchard Grass - Common Sheep Sorrel Herbaceous Alliance	Roughleaf Dogwood Shrubland Alliance	Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance	Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance	Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance	Bluejoint Seasonally Flooded Herbaceous Alliance	(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance	Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance	(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance	Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance	Common Buttonbush Semipermanently Flooded Shrubland Alliance	Speckled Alder Seasonally Flooded Shrubland Alliance	Common Reed Semipermanently Flooded Herbaceous Alliance	Purple Loosestrife Herbaceous Alliance	Reed Canarygrass Seasonally Flooded Herbaceous Alliance	Twisted Sedge Temporarily Flooded Herbaceous Alliance	Lowland Talus Sparsely Vegetated Alliance	ROW TOTAL (n_{i+})
Northern Red Oak - Chestnut Oak Woodland Alliance																																										**0**
White Oak - (Northern Red Oak, Hickory species) Forest Alliance			2	4		3	1	3						2		2																										**16**
(Pignut Hickory, Shagbark Hickory) - White Ash - (White Oak, Northern Red Oak) Forest Alliance						1								2										1									1								**5**
Northern Red Oak - (Sugar Maple) Forest Alliance		1		1		1								1																												**4**
Black Locust Forest Alliance								1																																		**1**
Quaking Aspen Woodland Alliance			2			1		3																							1											**8**
Eastern White Pine Forest Alliance							16	1																																		**17**
Black Cherry - Red Maple - Canadian Serviceberry - Oak species Forest Alliance						1							1					2	2					1																		**7**
Eastern White Pine Planted Forest Alliance							3		2																																	**5**
Eastern Hemlock - Yellow Birch Forest Alliance			1				3			6	3			2																											**15**
Eastern White Pine - Eastern Hemlock Forest Alliance																																										**0**
Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance			1	1			4	1		2		2	1		1																										**14**
Eastern White Pine - Sugar Maple Forest Alliance																																										**0**
Sugar Maple - White Ash - American Basswood Forest Alliance			1											1																											**2**
Sugar Maple - White Ash - American Basswood Forest Alliance																																										**0**
Box-elder Temporarily Flooded Forest Alliance																1	2							1																		**4**
Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance																																										**1**
(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance																	6	9																								**16**
Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance																	1																										**2**
Red Maple - Green Ash Seasonally Flooded Forest Alliance																				1																						**1**
Red Maple Seasonally Flooded Woodland Alliance				1																																						**1**
Red Maple - Green Ash Saturated Forest Alliance								1																	1																	**3**
Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance																																										**1**
Bracken Fern - Kalm's Brome Herbaceous Alliance																										5																**5**
Broomsedge Bluestem Herbaceous Alliance																											12	7	2														**23**
Orchard Grass - Common Sheep Sorrel Herbaceous Alliance																												28	2														**34**
Roughleaf Dogwood Shrubland Alliance				1			1	1																					7														**11**
Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance		1																												4													**5**
Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance			1																																								**1**
Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance																															3					2							**5**
Bluejoint Seasonally Flooded Herbaceous Alliance																																											**0**
(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance																												1															**3**
Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance																											1									1	3						**5**
(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance						1																									2									2	1		**6**
Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance																																											**0**
Common Buttonbush Semipermanently Flooded Shrubland Alliance																																											**2**
Speckled Alder Seasonally Flooded Shrubland Alliance																																											**1**
Common Reed Semipermanently Flooded Herbaceous Alliance																																											**0**
Purple Loosestrife Herbaceous Alliance																																											**0**
Reed Canarygrass Seasonally Flooded Herbaceous Alliance																	1	1																										**4**
Twisted Sedge Temporarily Flooded Herbaceous Alliance																1																											**2**
Lowland Talus Sparsely Vegetated Alliance	1																																										**1**
COLUMN TOTAL (n_{+j})	**1**	**2**	**8**	**8**	**0**	**8**	**28**	**11**	**2**	**8**	**3**	**2**	**2**	**6**	**3**	**2**	**12**	**12**	**0**	**1**	**1**	**0**	**4**	**5**	**13**	**36**	**13**	**4**	**0**	**11**	**1**	**2**	**4**	**0**	**1**	**4**	**1**	**1**	**1**	**8**	**2**	**0**	**231**

Table C-4. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Alliance Level, Saratoga National Historical Park.

Overall accuracy = 47.8%.	**Northern Red Oak - Chestnut Oak Woodland Alliance**	**White Oak - (Northern Red Oak, Hickory species) Forest Alliance**	**(Pignut Hickory, Shagbark Hickory) - White Ash - (White Oak, Northern Red Oak) Forest Alliance**	**Northern Red Oak - (Sugar Maple) Forest Alliance**	**Black Locust Forest Alliance**	**Quaking Aspen Woodland Alliance**	**Eastern White Pine Forest Alliance**	**Black Cherry - Red Maple - Canadian Serviceberry - Oak species Forest Alliance**	**Eastern White Pine Planted Forest Alliance**	**Eastern Hemlock - Yellow Birch Forest Alliance**	**Eastern White Pine - Eastern Hemlock Forest Alliance**	**Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance**	**Eastern White Pine - Sugar Maple Forest Alliance**	**Sugar Maple - White Ash - American Basswood Forest Alliance**	**Sugar Maple - White Ash - American Basswood Forest Alliance**	**Box-elder Temporarily Flooded Forest Alliance**	**Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance**	**(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance**	**Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance**	**Red Maple - Green Ash Seasonally Flooded Forest Alliance**	**Red Maple Seasonally Flooded Woodland Alliance**	**Red Maple - Green Ash Saturated Forest Alliance**	**Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance**	**Bracken Fern - Kalm's Brome Herbaceous Alliance**	**Broomsedge Bluestem Herbaceous Alliance**	**Orchard Grass - Common Sheep Sorrel Herbaceous Alliance**	**Roughleaf Dogwood Shrubland Alliance**	**Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance**	**Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance**	**Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance**	**Bluejoint Seasonally Flooded Herbaceous Alliance**	**(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance**	**Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance**	**(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance**	**Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance**	**Common Buttonbush Semipermanently Flooded Shrubland Alliance**	**Speckled Alder Seasonally Flooded Shrubland Alliance**	**Common Reed Semipermanently Flooded Herbaceous Alliance**	**Purple Loosestrife Herbaceous Alliance**	**Reed Canarygrass Seasonally Flooded Herbaceous Alliance**	**Twisted Sedge Temporarily Flooded Herbaceous Alliance**	**Lowland Talus Sparsely Vegetated Alliance**	**USERS' ACCURACY ($P_{i=j	i=j}$)**
Northern Red Oak - Chestnut Oak Woodland Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
White Oak - (Northern Red Oak, Hickory species) Forest Alliance	0.0000	0.0000	0.0038	0.0134	0.0000	0.0158	0.0023	0.0171	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
(Pignut Hickory, Shagbark Hickory) - White Ash - (White Oak, Northern Red Oak) Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0030	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0316	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Northern Red Oak - (Sugar Maple) Forest Alliance	0.0000	0.0197	0.0000	0.0156	0.0000	0.0050	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**33.9%**
Black Locust Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0015	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Quaking Aspen Woodland Alliance	0.0000	0.0000	0.0075	0.0000	0.0000	0.0298	0.0000	0.0754	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0189	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**22.5%**
Eastern White Pine Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.2338	0.0021	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**99.1%**
Black Cherry - Red Maple - Canadian Serviceberry - Oak species Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0090	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0179	0.0000	0.0000	0.0000	0.0038	0.0139	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Eastern White Pine Planted Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0116	0.0000	0.0044	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**27.4%**
Eastern Hemlock - Yellow Birch Forest Alliance	0.0000	0.0000	0.0017	0.0000	0.0000	0.0000	0.0043	0.0000	0.0000	0.0079	0.0080	0.0000	0.0000	0.0057	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**28.7%**
Eastern White Pine - Eastern Hemlock Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance	0.0000	0.0000	0.0012	0.0078	0.0000	0.0000	0.0138	0.0121	0.0000	0.0009	0.0136	0.0119	0.0120	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	**15.7%**
Eastern White Pine - Sugar Maple Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Sugar Maple - White Ash - American Basswood Forest Alliance	0.0000	0.0000	0.0059	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**12.2%**
Sugar Maple - White Ash - American Basswood Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Box-elder Temporarily Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0007	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**12.1%**
Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0048	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0049	0.0109	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**67.0%**
Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0023	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0017	0.0000	0.0000	**0.0%**
Red Maple - Green Ash Seasonally Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Red Maple Seasonally Flooded Woodland Alliance	0.0000	0.0000	0.0000	0.0018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Red Maple - Green Ash Saturated Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0084	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	**0.0%**
Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Bracken Fern - Kalm's Brome Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Broomsedge Bluestem Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**53.6%**
Orchard Grass - Common Sheep Sorrel Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**88.7%**
Roughleaf Dogwood Shrubland Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0031	0.0006	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0286	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0142	0.0000	0.0000	0.0000	0.0004	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**30.3%**
Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**92.3%**

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-4. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Alliance Level, Saratoga National Historical Park. (continued).

Overall accuracy = 47.8%.	Northern Red Oak - Chestnut Oak Woodland Alliance	White Oak - (Northern Red Oak, Hickory species) Forest Alliance	(Pignut Hickory, Shagbark Hickory) - White Ash - (White Oak, Northern Red Oak) Forest Alliance	Northern Red Oak - (Sugar Maple) Forest Alliance	Black Locust Forest Alliance	Quaking Aspen Woodland Alliance	Eastern White Pine Forest Alliance	Black Cherry - Red Maple - Canadian Serviceberry - Oak species Forest Alliance	Eastern White Pine Planted Forest Alliance	Eastern Hemlock - Yellow Birch Forest Alliance	Eastern White Pine - Eastern Hemlock Forest Alliance	Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance	Eastern White Pine - Sugar Maple Forest Alliance	Sugar Maple - White Ash - American Basswood Forest Alliance	Sugar Maple - White Ash - American Basswood Forest Alliance	Box-elder Temporarily Flooded Forest Alliance	Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance	(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance	Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance	Red Maple - Green Ash Seasonally Flooded Forest Alliance	Red Maple Seasonally Flooded Woodland Alliance	Red Maple - Green Ash Saturated Forest Alliance	Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance	Bracken Fern - Kalm's Brome Herbaceous Alliance	Broomsedge Bluestem Herbaceous Alliance	Orchard Grass - Common Sheep Sorrel Herbaceous Alliance	Roughleaf Dogwood Shrubland Alliance	Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance	Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance	Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance	Bluejoint Seasonally Flooded Herbaceous Alliance	(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance	Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance	(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance	Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance	Common Buttonbush Semipermanently Flooded Shrubland Alliance	Speckled Alder Seasonally Flooded Shrubland Alliance	Common Reed Semipermanently Flooded Herbaceous Alliance	Purple Loosestrife Herbaceous Alliance	Reed Canarygrass Seasonally Flooded Herbaceous Alliance	Twisted Sedge Temporarily Flooded Herbaceous Alliance	Lowland Talus Sparsely Vegetated Alliance	**USERS' ACCURACY ($P_{J=Y|i=Y}$)**
Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0053	0.0000	0.0000	0.0000	0.0000	0.0024	0.0000	**69.0%**
Bluejoint Seasonally Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0014	0.0000	0.0000	**73.7%**
(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0000	0.0000	0.0000	0.0000	0.0000	0.0055	0.0087	0.0000	**0.0%**
Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Common Buttonbush Semipermanently Flooded Shrubland Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	**100.0%**
Speckled Alder Seasonally Flooded Shrubland Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Common Reed Semipermanently Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Purple Loosestrife Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Reed Canarygrass Seasonally Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0007	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	**76.2%**
Twisted Sedge Temporarily Flooded Herbaceous Alliance	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	**60.1%**
Lowland Talus Sparsely Vegetated Alliance	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
PRODUCERS' ACCURACY (Pi=Y|J=Y)	**0.0%**	**0.0%**	**0.0%**	**40.3%**	**0.0%**	**44.9%**	**86.9%**	**0.0%**	**100.0%**	**89.8%**	**0.0%**	**100.0%**	**0.0%**	**1.9%**	**0.0%**	**51.9%**	**0.0%**	**42.9%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**	**34.6%**	**100.0%**	**98.3%**	**82.5%**	**26.9%**	**100.0%**	**0.0%**	**21.2%**	**0.0%**	**0.0%**	**39.2%**	**0.0%**	**0.0%**	**29.5%**	**0.0%**	**0.0%**	**0.0%**	**28.4%**	**2.6%**	**0.0%**	

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-5. Sample (raw counts) contingency table at USNVC Group Level, Saratoga National Historical Park.

	Appalachian Oak - Chestnut Forest Group (G015)	Northeastern and North-Central Oak-Hickory Forest Group (G158)	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)	Northern and Central Conifer and Hardwood Plantation Group (G032)	Northern Hardwood – Hemlock - White Pine Forest Group (G163)	Appalachian and Interior Mesophytic Forest Group (G020)	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)	Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)	Central Flatwoods and Pond Forest Group (G597)	Northern and Central Sand Barrens Group (G059)	Northern and Central Ruderal Meadow and Shrubland Group (G059)	Eastern North American Lake Flat and Beach Group (G342)	Northeastern and Appalachian Forest Seep Group (G189)	Eastern North American Wet Meadow Group (G112)	Eastern North American Freshwater Marsh Group (G125)	Northern and Central Shrub Swamp Group (G167)	Northern and Central Ruderal Wet Meadow and Marsh Group (G556)	Northern and Central Riverscour Wetland Group (G194)	Eastern North American Talus and Bluff Group (G340)	ROW TOTAL (n_{i+})
Appalachian Oak - Chestnut Forest Group (G015)																				**0**
Northeastern and North-Central Oak-Hickory Forest Group (G158)		**3**	**11**		**4**				**1**					**2**						**21**
Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)		**2**	**23**		**1**		**4**		**1**		**1**			**1**						**33**
Northern and Central Conifer and Hardwood Plantation Group (G032)			**3**	**2**																**5**
Northern Hardwood – Hemlock - White Pine Forest Group (G163)		**4**	**9**		**21**											**1**				**35**
Appalachian and Interior Mesophytic Forest Group (G020)																				**0**
Silver Maple – Green Ash – Sycamore Floodplain Group (G040)							**19**		**1**						**2**		**1**			**23**
Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)			**2**					**1**			**1**						**1**			**5**
Central Flatwoods and Pond Forest Group (G597)									**1**											**1**
Northern and Central Sand Barrens Group (G059)										**5**										**5**
Northern and Central Ruderal Meadow and Shrubland Group (G059)			**2**			**1**					**58**			**4**	**1**		**2**			**68**
Eastern North American Lake Flat and Beach Group (G342)		**1**										**4**								**5**
Northeastern and Appalachian Forest Seep Group (G189)		**1**																		**1**
Eastern North American Wet Meadow Group (G112)											**2**			**7**			**2**			**11**
Eastern North American Freshwater Marsh Group (G125)			**1**											**2**		**2**	**2**	**1**		**8**
Northern and Central Shrub Swamp Group (G167)								**1**								**2**				**3**
Northern and Central Ruderal Wet Meadow and Marsh Group (G556)							**2**										**2**			**4**
Northern and Central Riverscour Wetland Group (G194)							**1**											**1**		**2**
Eastern North American Talus and Bluff Group (G340)	**1**																			**1**
COLUMN TOTAL (n_{+j})	**1**	**11**	**51**	**2**	**26**	**1**	**26**	**2**	**4**	**5**	**62**	**4**	**0**	**16**	**3**	**5**	**10**	**2**	**0**	**231**

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-6. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Group Level, Saratoga National Historical Park.

Overall accuracy = 66.4%	**Appalachian Oak - Chestnut Forest Group (G015)**	**Northeastern and North-Central Oak-Hickory Forest Group (G158)**	**Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)**	**Northern and Central Conifer and Hardwood Plantation Group (G032)**	**Northern Hardwood – Hemlock - White Pine Forest Group (G163)**	**Appalachian and Interior Mesophytic Forest Group (G020)**	**Silver Maple – Green Ash – Sycamore Floodplain Group (G040)**	**Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)**	**Central Flatwoods and Pond Forest Group (G597)**	**Northern and Central Sand Barrens Group (G059)**	**Northern and Central Ruderal Meadow and Shrubland Group (G059)**	**Eastern North American Lake Flat and Beach Group (G342)**	**Northeastern and Appalachian Forest Seep Group (G189)**	**Eastern North American Wet Meadow Group (G112)**	**Eastern North American Freshwater Marsh Group (G125)**	**Northern and Central Shrub Swamp Group (G167)**	**Northern and Central Ruderal Wet Meadow and Marsh Group (G556)**	**Northern and Central Riverscour Wetland Group (G194)**	**Eastern North American Talus and Bluff Group (G340)**	**USERS' ACCURACY ($P_{J=XJ=J}$)**
Appalachian Oak - Chestnut Forest Group (G015)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Northeastern and North-Central Oak-Hickory Forest Group (G158)	0.0000	0.0091	0.0404	0.0000	0.0375	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0000	**10.0%**
Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)	0.0000	0.0075	0.3517	0.0000	0.0179	0.0000	0.0177	0.0000	0.0023	0.0000	0.0189	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	0.0000	**84.4%**
Northern and Central Conifer and Hardwood Plantation Group (G032)	0.0000	0.0000	0.0116	0.0044	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**27.4%**
Northern Hardwood – Hemlock - White Pine Forest Group (G163)	0.0000	0.0285	0.0352	0.0000	0.0900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	**57.5%**
Appalachian and Interior Mesophytic Forest Group (G020)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Silver Maple – Green Ash – Sycamore Floodplain Group (G040)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0191	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0053	0.0000	0.0017	0.0000	0.0000	**71.9%**
Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)	0.0000	0.0000	0.0102	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0143	0.0000	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000	**1.7%**
Central Flatwoods and Pond Forest Group (G597)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Northern and Central Sand Barrens Group (G059)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**100.0%**
Northern and Central Ruderal Meadow and Shrubland Group (G059)	0.0000	0.0000	0.0036	0.0000	0.0000	0.0286	0.0000	0.0000	0.0000	0.0000	0.1704	0.0000	0.0000	0.0096	0.0002	0.0000	0.0018	0.0000	0.0000	**79.5%**
Eastern North American Lake Flat and Beach Group (G342)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**92.3%**
Northeastern and Appalachian Forest Seep Group (G189)	0.0000	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Eastern North American Wet Meadow Group (G112)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0067	0.0000	0.0000	0.0003	0.0000	0.0000	**88.6%**
Eastern North American Freshwater Marsh Group (G125)	0.0000	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0064	0.0000	0.0024	0.0055	0.0087	0.0000	**0.0%**
Northern and Central Shrub Swamp Group (G167)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	**33.1%**
Northern and Central Ruderal Wet Meadow and Marsh Group (G556)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000	**76.2%**
Northern and Central Riverscour Wetland Group (G194)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	**60.1%**
Eastern North American Talus and Bluff Group (G340)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
PRODUCERS' ACCURACY ($P_{I=YIJ=Y}$)	**0.0%**	**20.2%**	**77.0%**	**100.0%**	**61.9%**	**0.0%**	**50.0%**	**18.6%**	**34.6%**	**100.0%**	**83.5%**	**100.0%**	**0.0%**	**26.2%**	**0.0%**	**16.3%**	**25.3%**	**2.6%**	**0.0%**	

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

Table C-7. Sample (raw counts) contingency table at USNVC Macrogroup Level, Saratoga National Historical Park.

	Central Oak-Hardwood and Pine Forest (M012)	Eastern North American Ruderal Forest and Plantation (M013)	Northern Mesic Hardwood and Conifer Forest (M014)	Central Mesophytic-Hardwood Forest (M153)	Northern and Central Floodplain Forest and Scrub (M029)	Northern and Central Swamp Forest (M030)	Eastern North American Prairie and Barrens (M163)	Eastern North American Ruderal Grassland and Shrubland (M123)	Eastern North American Beach, Shoreline, and Flat (M176)	Appalachian, Interior Plateau, and Prairie Fen (M061)	Eastern North American Wet Meadow and Marsh (M069)	Northern and Central Tall Shrub Wetland (M160)	Eastern North American Ruderal Wet Meadow and Marsh (M303)	Eastern North American Riverscour Wetland (M165)	Eastern North American Cliff, and Rock Vegetation (M111)	ROW TOTAL (n_{i+})
Central Oak-Hardwood and Pine Forest (M012)	3	11	4			1					2					**21**
Eastern North American Ruderal Forest and Plantation (M013)	2	28	1		4	1		1			1					**38**
Northern Mesic Hardwood and Conifer Forest (M014)	4	9	21									1				**35**
Central Mesophytic-Hardwood Forest (M153)																**0**
Northern and Central Floodplain Forest and Scrub (M029)					19	1					2		1			**23**
Northern and Central Swamp Forest (M030)		2				2		1					1			**6**
Eastern North American Prairie and Barrens (M163)							5									**5**
Eastern North American Ruderal Grassland and Shrubland (M123)		2		1				58			5		2			**68**
Eastern North American Beach, Shoreline, and Flat (M176)	1								4							**5**
Appalachian, Interior Plateau, and Prairie Fen (M061)	1															**1**
Eastern North American Wet Meadow and Marsh (M069)		1						2			9	2	4	1		**19**
Northern and Central Tall Shrub Wetland (M160)						1						2				**3**
Eastern North American Ruderal Wet Meadow and Marsh (M303)					2								2			**4**
Eastern North American Riverscour Wetland (M165)					1									1		**2**
Eastern North American Cliff, and Rock Vegetation (M111)	1															**1**
COLUMN TOTAL (n_{+j})	**12**	**53**	**26**	**1**	**26**	**6**	**5**	**62**	**4**	**0**	**19**	**5**	**10**	**2**	**0**	**231**

Table C-8. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Macrogroup Level, Saratoga National Historical Park.

Overall accuracy = 68.2%	**Central Oak-Hardwood and Pine Forest (M012)**	**Eastern North American Ruderal Forest and Plantation (M013)**	**Northern Mesic Hardwood and Conifer Forest (M014)**	**Central Mesophytic-Hardwood Forest (M153)**	**Northern and Central Floodplain Forest and Scrub (M029)**	**Northern and Central Swamp Forest (M030)**	**Eastern North American Prairie and Barrens (M163)**	**Eastern North American Ruderal Grassland and Shrubland (M123)**	**Eastern North American Beach, Shoreline, and Flat (M176)**	**Appalachian, Interior Plateau, and Prairie Fen (M061)**	**Eastern North American Wet Meadow and Marsh (M069)**	**Northern and Central Tall Shrub Wetland (M160)**	**Eastern North American Ruderal Wet Meadow and Marsh (M303)**	**Eastern North American Riverscour Wetland (M165)**	**Eastern North American Cliff, and Rock Vegetation (M111)**	**USERS' ACCURACY ($P_{J=X\|I=X}$)**
Central Oak-Hardwood and Pine Forest (M012)	0.0091	0.0404	0.0375	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	0.0022	0.0000	0.0000	0.0000	0.0000	10.0%
Eastern North American Ruderal Forest and Plantation (M013)	0.0075	0.3677	0.0179	0.0000	0.0177	0.0023	0.0000	0.0189	0.0000	0.0000	0.0008	0.0000	0.0000	0.0000	0.0000	85.0%
Northern Mesic Hardwood and Conifer Forest (M014)	0.0285	0.0352	0.0900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0027	0.0000	0.0000	0.0000	57.5%
Central Mesophytic-Hardwood Forest (M153)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0%
Northern and Central Floodplain Forest and Scrub (M029)	0.0000	0.0000	0.0000	0.0000	0.0191	0.0005	0.0000	0.0000	0.0000	0.0000	0.0053	0.0000	0.0017	0.0000	0.0000	71.9%
Northern and Central Swamp Forest (M030)	0.0000	0.0102	0.0000	0.0000	0.0000	0.0031	0.0000	0.0143	0.0000	0.0000	0.0000	0.0000	0.0028	0.0000	0.0000	10.2%
Eastern North American Prairie and Barrens (M163)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0025	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	100.0%
Eastern North American Ruderal Grassland and Shrubland (M123)	0.0000	0.0036	0.0000	0.0286	0.0000	0.0000	0.0000	0.1704	0.0000	0.0000	0.0098	0.0000	0.0018	0.0000	0.0000	79.5%
Eastern North American Beach, Shoreline, and Flat (M176)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	92.3%
Appalachian, Interior Plateau, and Prairie Fen (M061)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0%
Eastern North American Wet Meadow and Marsh (M069)	0.0000	0.0038	0.0000	0.0000	0.0000	0.0000	0.0000	0.0006	0.0000	0.0000	0.0131	0.0024	0.0058	0.0087	0.0000	38.3%
Northern and Central Tall Shrub Wetland (M160)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0020	0.0000	0.0000	0.0000	0.0000	0.0000	0.0010	0.0000	0.0000	0.0000	33.1%
Eastern North American Ruderal Wet Meadow and Marsh (M303)	0.0000	0.0000	0.0000	0.0000	0.0013	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0041	0.0000	0.0000	76.2%
Eastern North American Riverscour Wetland (M165)	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	60.1%
Eastern North American Cliff, and Rock Vegetation (M111)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0%
PRODUCERS' ACCURACY ($P_{I=Y\|J=Y}$)	20.1%	79.8%	61.9%	0.0%	50.0%	30.7%	100.0%	83.5%	100.0%	0.0%	42.1%	16.3%	25.3%	2.6%	0.0%	

Appendix C. Thematic Accuracy Assessment Contingency Tables (continued).

T**able C-9.** Sample (raw counts) contingency table at USNVC Division Level, Saratoga National Historical Park.

	Eastern North American Cool Temperate Forest (D008)	Eastern North American Flooded and Swamp Forest (D011)	Eastern North American Grassland, Meadow, and Shrubland (D024)	Eastern North American Dune and Coastal Grassland and Shrubland (D026)	North American Bog and Fen (D029)	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)	Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)
Eastern North American Cool Temperate Forest (D008)	83	6	1			4	**94**
Eastern North American Flooded and Swamp Forest (D011)	2	22	1			4	**29**
Eastern North American Grassland, Meadow, and Shrubland (D024)	3		63			7	**73**
Eastern North American Dune and Coastal Grassland and Shrubland (D026)	1			4			**5**
North American Bog and Fen (D029)	1						**1**
Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)	1	4	2			21	**28**
Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)	1						**1**
COLUMN TOTAL (n_{+j})	**92**	**32**	**67**	**4**	**0**	**36**	**231**

Table C-10. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Division Level, Saratoga National Historical Park.

Overall accuracy = 86.7%	Eastern North American Cool Temperate Forest (D008)	Eastern North American Flooded and Swamp Forest (D011)	Eastern North American Grassland, Meadow, and Shrubland (D024)	Eastern North American Dune and Coastal Grassland and Shrubland (D026)	North American Bog and Fen (D029)	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)	Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)	USERS' ACCURACY ($P_{J=X\|I=X}$)
Eastern North American Cool Temperate Forest (D008)	0.6339	0.0222	0.0189	0.0000	0.0000	0.0057	0.0000	**93.1%**
Eastern North American Flooded and Swamp Forest (D011)	0.0102	0.0227	0.0143	0.0000	0.0000	0.0098	0.0000	**39.8%**
Eastern North American Grassland, Meadow, and Shrubland (D024)	0.0322	0.0000	0.1729	0.0000	0.0000	0.0116	0.0000	**79.8%**
Eastern North American Dune and Coastal Grassland and Shrubland (D026)	0.0000	0.0000	0.0000	0.0005	0.0000	0.0000	0.0000	**100.0%**
North American Bog and Fen (D029)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)	0.0038	0.0035	0.0006	0.0000	0.0000	0.0353	0.0000	**81.9%**
Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)	0.0001	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	**0.0%**
PRODUCERS' ACCURACY ($P_{i=Y\|J=Y}$)	**93.2%**	**46.9%**	**83.7%**	**100.0%**	**0.0%**	**56.6%**	**0.0%**	

Table C-11. Sample (raw counts) contingency table at USNVC Subclass Level, Saratoga National Historical Park.

	Temperate Forest (1.C)	Temperate and Boreal Shrubland and Grassland (2.C)	Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation (6.B)	ROW TOTAL (n_{i+})
Temperate Forest (1.C)	113	10		**123**
Temperate and Boreal Shrubland and Grassland (2.C)	10	97		**107**
Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation (6.B)	1			**1**
COLUMN TOTAL (n_{+j})	**124**	**107**	**0**	**231**

Table C-12. Population contingency table, with point estimates of map class user's and producer's accuracies at USNVC Subclass Level, Saratoga National Historical Park.

Overall accuracy = 91.1%	Temperate Forest (1.C)	Temperate and Boreal Shrubland and Grassland (2.C)	Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation (6.B)	ROW TOTAL (n_{i+})
Temperate Forest (1.C)	0.6890	0.0487	0.0000	**93.4%**
Temperate and Boreal Shrubland and Grassland (2.C)	0.0396	0.2208	0.0000	**84.8%**
Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation (6.B)	0.0001	0.0000	0.0000	**0.0%**
PRODUCERS' ACCURACY ($P_{i=Y\backslash J=Y}$)	**94.6%**	**81.9%**	**0.0%**	

Appendix D: Plant species observed in Saratoga National Historical Park during vegetation plot and thematic accuracy assessment sampling

The common and scientific names of 389 plant species observed during the vegetation plot and thematic accuracy assessment sampling are listed below. The list includes plant taxa identified to species or subspecific rank or plant taxa identified uniquely within the project to a genus. Nomenclature follows the PLANTS 3.5 Database developed by the Natural Resource Conservation Service in cooperation with the Biota of North America Program (USDA NRCS 2013) (http://plants.usda.gov, as accessed on September 9, 2013). For this report, some common names listed in the PLANTS database were changed to reflect the common names typically used by ecologists and resource managers in this region. Species not sampled within classification or AA plots but were observed during vegetation plot sampling are included in Table D-1 without an assignment to the PLOT Species (PS) and/or AA Species (AA) fields. Species with an asterisk (*) following the scientific name are exotic/introduced taxa as determined by project ecologists or as described within the USDA NRCS PLANTS Database (2013).

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park.

Family	Scientific Name	Common Name
Aceraceae	*Acer negundo*	boxelder [AA, PS]
	*Acer platanoides**	Norway maple [AA, PS]
	Acer rubrum	red maple [AA, PS]
	Acer saccharinum	silver maple [AA,PS]
	Acer saccharum	sugar maple [AA, PS]
Alismataceae	*Alisma subcordatum*	American water plantain [PS]
	Alisma triviale	northern water plantain [AA]
	Sagittaria latifolia	broadleaf arrowhead [AA, PS]
Anacardiaceae	*Rhus glabra*	smooth sumac [PS]
	Rhus typhina	staghorn sumac [AA, PS]
	Toxicodendron radicans	eastern poison ivy [AA, PS]
Apiaceae	*Cicuta bulbifera*	bulblet-bearing water hemlock [AA]
	Cicuta maculata	spotted water hemlock [PS]
	*Daucus carota**	Queen Anne's lace [AA, PS]
	Hydrocotyle americana	American marshpennywort [AA]
	Sium suave	hemlock waterparsnip [PS]
Apocynaceae	*Apocynum cannabinum*	Indianhemp [AA, PS]
Aquifoliaceae	*Ilex verticillata*	common winterberry [AA]
Araceae	*Arisaema dracontium*	green dragon [PS]
	Arisaema triphyllum	Jack in the pulpit [AA, PS]
	Peltandra virginica	green arrow arum [AA, PS]
	Symplocarpus foetidus	skunk cabbage [AA, PS]
Araliaceae	*Aralia nudicaulis*	wild sarsaparilla [AA]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Aristolochiaceae	*Asarum canadense*	Canadian wildginger
Asclepiadaceae	*Asclepias incarnata*	swamp milkweed [AA, PS]
	Asclepias syriaca	common milkweed [AA, PS]
Asteraceae	*Achillea millefolium**	common yarrow [AA, PS]
	Ageratina altissima var. *altissima*	white snakeroot [AA, PS]
	Antennaria howellii	Howell's pussytoes [AA]
	*Arctium lappa**	greater burdock [AA]
	*Artemisia vulgaris**	common wormwood [AA]
	Bidens connata	purplestem beggarticks [PS]
	Bidens frondosa	devil's beggartick [AA, PS]
	*Centaurea jacea**	brownray knapweed [AA, PS]
	Centaurea stoebe ssp. *micranthos**	spotted knapweed [AA, PS]
	Cirsium pumilum	pasture thistle [AA]
	*Cirsium vulgare**	bull thistle [PS]
	Erechtites hieraciifolia	American burnweed [PS]
	Eutrochium maculatum	spotted joepyeweed [AA, PS]
	Eupatorium perfoliatum	common boneset [AA, PS]
	Eurybia divaricata	white wood aster [AA, PS]
	Eurybia macrophylla	bigleaf aster [PS]
	Euthamia graminifolia	flat-top goldentop [AA, PS]
	*Hieracium aurantiacum**	orange hawkweed
	*Inula helenium**	elecampane inula [AA]
	*Leucanthemum vulgare**	oxeye daisy [AA, PS]
	Prenanthes alba	white rattlesnakeroot [AA]
	Rudbeckia hirta+	blackeyed Susan [AA, PS]
	Rudbeckia laciniata	cutleaf coneflower [AA]
	Silphium perfoliatum	cup plant [PS]
	Solidago altissima	goldenrod [AA]
	Solidago bicolor	white goldenrod [PS]
	Solidago caesia	wreath goldenrod [AA, PS]
	Solidago canadensis	Canada goldenrod [AA, PS]
	Solidago gigantea	giant goldenrod [AA, PS]
	Solidago juncea	early goldenrod [AA, PS]
	Solidago nemoralis	gray goldenrod [AA, PS]
	Solidago odora	anisescented goldenrod [AA]
	Solidago rugosa	wrinkleleaf goldenrod [AA, PS]
	Solidago squarrosa	stout goldenrod [AA]
	Symphyotrichum dumosum	rice button aster [PS]
	Symphyotrichum laeve	smooth blue aster [AA, PS]
	Symphyotrichum lanceolatum	white panicle aster [PS]
	Symphyotrichum lateriflorum	calico aster [AA, PS]
	Symphyotrichum novae-angliae	New England aster [PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Asteraceae (cont.)	*Symphyotrichum pilosum*	hairy white oldfield aster [AA]
	Symphyotrichum puniceum	purplestem aster [AA, PS]
	*Taraxacum officinale**	common dandelion [PS]
	*Tussilago farfara**	coltsfoot [PS]
	Xanthium strumarium	rough cocklebur [PS]
Balsaminaceae	*Impatiens capensis*	jewelweed [AA, PS]
	Impatiens pallida	pale touch-me-not [AA]
Berberidaceae	*Berberis thunbergii**	Japanese barberry [AA]
	Podophyllum peltatum	Mayapple [AA, PS]
Betulaceae	*Alnus incana* ssp. *rugosa*	speckled alder [AA]
	Alnus serrulata	hazel alder [AA]
	Betula alleghaniensis	yellow birch [AA, PS]
	Betula lenta	sweet birch [AA, PS]
	Betula papyrifera	paper birch [PS]
	Betula populifolia	gray birch [AA, PS]
	Carpinus caroliniana	American hornbeam [AA, PS]
	Corylus americana	American hazelnut [AA, PS]
	Corylus cornuta	beaked hazelnut [AA]
	Ostrya virginiana	hophornbeam [AA, PS]
Boraginaceae	*Hackelia virginiana*	beggarslice [AA, PS]
	Myosotis laxa	bay forget-me-not [AA, PS]
Brachytheciaceae	*Brachythecium salebrosum*	brachythecium moss [AA, PS]
Brassicaceae	*Alliaria petiolata**	garlic mustard [AA, PS]
	Arabis glabra	tower rockcress [PS]
	Cardamine pensylvanica	Pennsylvania bittercress [PS]
	*Hesperis matronalis**	dames rocket [PS]
Campanulaceae	*Lobelia cardinalis*	cardinalflower [PS]
	Lobelia inflata	Indian-tobacco [PS]
Caprifoliaceae	*Lonicera tatarica**	Tatarian honeysuckle [AA, PS]
	Sambucus nigra ssp. *canadensis*	American black elderberry [AA, PS]
	Viburnum acerifolium	mapleleaf viburnum [AA, PS]
	Viburnum dentatum	southern arrowwood [AA, PS]
	*Viburnum lantana**	Wayfaringtree [PS]
	Viburnum lentago	nannyberry [AA, PS]
	Viburnum nudum var. *cassinoides*	withe-rod [AA]
Celastraceae	*Celastrus orbiculatus**	oriental bittersweet [AA]
Ceratophyllaceae	*Ceratophyllum demersum*	coon's tail [AA]
Climaciaceae	*Climacium dendroides*	tree climacium moss [PS]
Clusiaceae	*Hypericum perforatum**	common St. Johnswort [AA, PS]
	Hypericum punctatum	spotted St. Johnswort [AA, PS]
Convolvulaceae	*Convolvulus arvensis**	field bindweed [AA]
Cornaceae	*Cornus amomum*	silky dogwood [AA, PS]
	Cornus florida	flowering dogwood [AA]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Cornaceae (cont.)	*Cornus racemosa*	gray dogwood [AA, PS]
	Cornus rugosa	roundleaf dogwood [AA]
Cyperaceae	*Carex blanda*	eastern woodland sedge [PS]
	Carex bromoides	bromelike sedge [PS]
	Carex granularis	limestone meadow sedge [PS]
	Carex grayi	Gray's sedge [PS]
	Carex gynandra	nodding sedge [AA, PS]
	Carex hirsutella	fuzzy wuzzy sedge [PS]
	Carex intumescens	greater bladder sedge [AA]
	Carex lacustris	lake sedge [PS]
	Carex laxiflora	broad looseflower sedge [PS]
	Carex lucorum	Blue Ridge sedge [AA]
	Carex lupulina	hop sedge [AA, PS]
	Carex lurida	shallow sedge [AA, PS]
	Carex pensylvanica	Pennsylvania sedge [AA, PS]
	Carex platyphylla	broadleaf sedge [AA]
	Carex scabrata	eastern rough sedge [PS]
	Carex scoparia	broom sedge [AA, PS]
	Carex squarrosa	squarrose sedge [PS]
	Carex stricta	upright sedge [PS]
	Carex tribuloides	blunt broom sedge [AA]
	Carex trichocarpa	hairyfruit sedge [AA, PS]
	Carex tuckermanii	Tuckerman's sedge [PS]
	Carex vulpinoidea	fox sedge [AA, PS]
	Cyperus sp.	flatsedge [AA]
	Dulichium arundinaceum	threeway sedge [AA]
	Eleocharis ovata	ovate spikerush [AA]
	Scirpus atrovirens	green bulrush [AA, PS]
	Scirpus cyperinus	woolgrass [AA, PS]
	Scirpus georgianus	Georgia bulrush [AA]
	Scirpus pendulus	rufous bulrush [AA, PS]
Dennstaedtiaceae	*Dennstaedtia punctilobula*	eastern hayscented fern [AA, PS]
	Pteridium aquilinum	western brackenfern [AA, PS]
Dicranaceae	*Dicranum scoparium*	dicranum moss [PS]
Dryopteridaceae	*Athyrium filix-femina*	common ladyfern [AA, PS]
	Dryopteris carthusiana	spinulose woodfern [PS]
	Dryopteris clintoniana	Clinton's woodfern [PS]
	Dryopteris intermedia	intermediate woodfern [AA, PS]
	Dryopteris marginalis	marginal woodfern [AA, PS]
	Matteuccia struthiopteris	ostrich fern [AA, PS]
	Onoclea sensibilis	sensitive fern [AA, PS]
	Polystichum acrostichoides	Christmas fern [AA, PS]
Equisetaceae	*Equisetum arvense*	field horsetail [AA, PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Equisetaceae (cont.)	*Equisetum hyemale*	scouringrush horsetail [AA]
	Equisetum pratense	meadow horsetail [AA]
Ericaceae	*Gaultheria procumbens*	eastern teaberry [AA]
	Gaylussacia baccata	black huckleberry [AA]
	Lyonia ligustrina	maleberry [AA, PS]
	Vaccinium angustifolium	lowbush blueberry [AA]
	Vaccinium corymbosum	highbush blueberry [AA, PS]
	Vaccinium myrtilloides	velvetleaf huckleberry [PS]
	Vaccinium pallidum	Blue Ridge blueberry [AA, PS]
Fabaceae	*Amphicarpaea bracteata*	American hogpeanut [AA, PS]
	Apios americana	groundnut [PS]
	Desmodium glutinosum	pointedleaf ticktrefoil [PS]
	*Lotus corniculatus**	birdfoot deervetch [AA, PS]
	*Melilotus officinalis**	yellow sweetclover [AA, PS]
	*Robinia pseudoacacia**	black locust [AA, PS]
	Senna hebecarpa	American senna [PS]
	*Trifolium arvense**	rabbitfoot clover [PS]
	*Trifolium aureum**	golden clover [AA, PS]
	*Trifolium campestre**	field clover [AA]
	*Trifolium pratense**	red clover [PS]
	*Vicia cracca**	bird vetch [AA, PS]
Fagaceae	*Castanea dentata*	American chestnut [PS]
	Fagus grandifolia	American beech [AA, PS]
	Quercus alba	white oak [AA, PS]
	Quercus bicolor	swamp white oak [AA, PS]
	Quercus coccinea	scarlet oak [AA, PS]
	Quercus rubra	northern red oak [AA, PS]
	Quercus velutina	black oak [PS]
Geraniaceae	*Geranium maculatum*	spotted geranium [AA, PS]
	Geranium robertianum	Robert geranium
Grossulariaceae	*Ribes cynosbati*	eastern prickly gooseberry [AA]
	Ribes glandulosum	skunk currant [PS]
Hamamelidaceae	*Hamamelis virginiana*	American witchhazel [AA, PS]
Hydrocharitaceae	*Elodea canadensis*	Canadian waterweed [PS]
	Vallisneria americana	American eelgrass [PS]
Hypnaceae	*Hypnum imponens*	hypnum moss [PS]
	*Trifolium campestre**	field clover [AA]
Iridaceae	*Iris pseudacorus*	paleyellow iris [AA, PS]
	Iris versicolor	harlequin blueflag [AA, PS]
Juglandaceae	*Carya cordiformis*	bitternut hickory [AA, PS]
	Carya glabra	pignut hickory [AA, PS]
	Carya ovata	shagbark hickory [AA, PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Juglandaceae (cont.)	*Carya alba*	mockernut hickory
	Juglans nigra	black walnut [AA]
Juncaceae	*Juncus effusus*	common rush [AA, PS]
	Juncus tenuis	poverty rush [AA, PS]
Lamiaceae	*Clinopodium vulgare*	wild basil [AA, PS]
	*Glechoma hederacea**	ground ivy [AA, PS]
	Lycopus americanus	American water horehound [AA]
	Lycopus uniflorus	northern bugleweed [AA, PS]
	Mentha arvensis	wild mint [PS]
	Monarda fistulosa	wild bergamot [AA, PS]
	Prunella vulgaris+	common selfheal [AA, PS]
	Pycnanthemum tenuifolium	narrowleaf mountainmint [AA, PS]
	Scutellaria lateriflora	blue skullcap [PS]
	Teucrium canadense	Canada germander [PS]
	*Thymus pulegioides**	lemon thyme [AA]
	*Thymus vulgaris**	garden thyme [PS]
Lauraceae	*Sassafras albidum*	sassafras [AA, PS]
Lemnaceae	*Lemna minor*	common duckweed [AA, PS]
	Spirodela polyrrhiza	common duckmeat [AA]
	Wolffia brasiliensis	Brazilian watermeal [PS]
Leucobryaceae	*Leucobryum glaucum*	leucobryum moss [PS]
Liliaceae	*Maianthemum canadense*	Canada mayflower [AA, PS]
	Maianthemum racemosum	feathery false lily of the valley [AA, PS]
	Medeola virginiana	Indian cucumber [AA]
	Polygonatum pubescens	hairy Solomon's seal [PS]
	Trillium erectum	red trillium [PS]
	Uvularia perfoliata	perfoliate bellwort [AA]
	Uvularia sessilifolia	sessileleaf bellwort [AA, PS]
Lythraceae	*Lythrum salicaria**	purple loosestrife [AA, PS]
Magnoliaceae	*Magnolia acuminata+*	cucumber-tree [PS]
Menispermaceae	*Menispermum canadense*	common moonseed [PS]
Mniaceae	*Plagiomnium cuspidatum*	toothed plagiomnium moss [PS]
Monotropaceae	*Monotropa hypopithys*	pinesap [PS]
	Monotropa uniflora	Indianpipe [AA, PS]
Moraceae	*Morus alba**	white mulberry [PS]
Myricaceae	*Comptonia peregrina*	sweet fern [AA, PS]
Nymphaeaceae	*Nymphaea odorata*	American white waterlily [PS]
Oleaceae	*Fraxinus americana*	white ash [AA, PS]
	Fraxinus nigra	black ash [AA]
	Fraxinus pennsylvanica	green ash [AA, PS]
Onagraceae	*Circaea alpina*	small enchanter's nightshade [AA]
	Circaea lutetiana	broadleaf enchanter's nightshade [AA, PS]
	Epilobium ciliatum	fringed willowherb [AA]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Onagraceae (cont.)	*Epilobium coloratum*	purpleleaf willowherb [AA, PS]
	Ludwigia palustris	marsh seedbox [AA, PS]
Orchidaceae	*Epipactis helleborine**	broadleaf helleborine [PS]
Orobanchaceae	*Epifagus virginiana*	beechdrops [PS]
Osmundaceae	*Osmunda cinnamomea*	cinnamon fern [AA, PS]
	Osmunda claytoniana	interrupted fern [AA, PS]
	Osmunda regalis	royal fern [AA, PS]
Oxalidaceae	*Oxalis stricta*	common yellow oxalis [AA, PS]
Pinaceae	*Picea abies**	Norway spruce
	Pinus strobus	eastern white pine [AA, PS]
	Tsuga canadensis	eastern hemlock [AA, PS]
Plagiotheciaceae	*Plagiothecium* sp.	plagiothecium moss [PS]
Plantaginaceae	*Plantago major**	common plantain [AA, PS]
Platanaceae	*Platanus occidentalis*	American sycamore [AA]
Poaceae	*Agrostis perennans*	upland bentgrass [PS]
	Andropogon gerardii	big bluestem [AA, PS]
	*Anthoxanthum odoratum**	sweet vernalgrass [PS]
	Brachyelytrum erectum	bearded shorthusk [AA, PS]
	*Bromus arvensis**	field brome [AA]
	*Bromus inermis**	smooth brome [AA, PS]
	Calamagrostis canadensis	bluejoint [AA, PS]
	Cinna latifolia	drooping woodreed [AA, PS]
	*Dactylis glomerata**	orchardgrass [AA, PS]
	Danthonia spicata	poverty oatgrass [AA, PS]
	Deschampsia flexuosa	wavy hairgrass [AA]
	Dichanthelium clandestinum	deertongue [PS]
	Elymus hystrix	eastern bottlebrush grass [AA, PS]
	Elymus riparius	riverbank wildrye
	Elymus villosus	hairy wildrye
	Elymus virginicus	Virginia wildrye [AA, PS]
	Eragrostis spectabilis	purple lovegrass [PS]
	*Festuca rubra**	red fescue [AA, PS]
	Glyceria melicaria	melic mannagrass [PS]
	Glyceria striata	fowl mannagrass [PS]
	Leersia oryzoides	rice cutgrass [AA, PS]
	Leersia virginica	whitegrass [AA, PS]
	Phalaris arundinacea	reed canarygrass [AA, PS]
	*Phleum pratense**	timothy [AA, PS]
	*Phragmites australis**	common reed [AA]
	Piptatherum racemosum	blackseed ricegrass [AA, PS]
	*Poa compressa**	Canada bluegrass [AA, PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Poaceae (cont.)	*Poa pratensis**	Kentucky bluegrass [AA, PS]
	*Poa trivialis**	rough bluegrass [PS]
	Schizachyrium scoparium	little bluestem [AA, PS]
	*Setaria viridis**	green bristlegrass [PS]
	*Zea mays**	corn
	Zizania aquatica	annual wildrice [PS]
Polygalaceae	*Polygala incarnata*	procession flower [PS]
	Polygala sanguinea	purple milkwort [PS]
Polygonaceae	*Polygonum arifolium (=Persicaria arifolia)*	halberdleaf tearthumb [AA]
	*Polygonum cuspidatum**	Japanese knotweed [PS]
	Polygonum hydropiper (=Persicaria hydropiper)*	marshpepper knotweed [AA, PS]
	Polygonum hydropiperoides	swamp smartweed
	Polygonum pensylvanicum	Pennsylvania smartweed [PS]
	Polygonum persicaria (=Persicaria maculosa)*	spotted lady's-thumb [PS]
	Polygonum punctatum (=Persicaria punctata)	dotted smartweed [AA]
	Polygonum sagittatum (=Persicaria sagittata)	arrowleaf tearthumb [AA, PS]
	Polygonum virginianum (=Persicaria virginiana)	Jumpseed [AA, PS]
	*Rumex acetosella**	common sheep sorrel [AA, PS]
	*Rumex crispus**	curly dock [PS]
	Rumex orbiculatus	greater water dock [PS]
	Rumex verticillatus	swamp dock [PS]
Polypodiaceae	*Polypodium virginianum*	rock polypody [PS]
Polytrichaceae	*Atrichum angustatum*	atrichum moss [PS]
	Polytrichum commune	polytrichum moss [AA, PS]
Pontederiaceae	*Heteranthera dubia*	grassleaf mudplantain [AA]
	Pontederia cordata	Pickerelweed [AA, PS]
Potamogetonaceae	*Potamogeton epihydrus*	ribbonleaf pondweed [AA, PS]
Primulaceae	*Lysimachia ciliata*	fringed loosestrife [PS]
	*Lysimachia nummularia**	creeping jenny [AA, PS]
	Lysimachia quadrifolia	whorled yellow loosestrife [PS]
	Lysimachia terrestris	earth loosestrife [PS]
	Trientalis borealis	starflower [AA, PS]
Pteridaceae	*Adiantum pedatum*	northern maidenhair [AA, PS]
Ranunculaceae	*Actaea pachypoda*	white baneberry [AA, PS]
	Anemone canadensis	Canadian anemone [PS]
	Aquilegia canadensis	red columbine [PS]
	Clematis virginiana	devil's darning needles [AA, PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Ranunculaceae (cont.)	*Hepatica nobilis*	hepatica
	Ranunculus abortivus	littleleaf buttercup [PS]
	*Ranunculus parviflorus**	smallflower buttercup [AA]
	Ranunculus recurvatus	blisterwort [AA]
	*Ranunculus repens**	creeping buttercup [AA]
	Thalictrum pubescens	king of the meadow [PS]
Rhamnaceae	*Rhamnus cathartica**	common buckthorn [AA, PS]
Rosaceae	*Agrimonia gryposepala*	tall hairy agrimony [AA, PS]
	Agrimonia parviflora	harvestlice
	Amelanchier arborea	common serviceberry [AA, PS]
	Crataegus sp.	hawthorn [AA, PS]
	Fragaria virginiana	Virginia strawberry [AA, PS]
	Geum canadense	white avens [AA, PS]
	*Malus pumila**	paradise apple [PS]
	Potentilla canadensis	dwarf cinquefoil [PS]
	Potentilla simplex	common cinquefoil [AA]
	Prunus americana	American plum [AA]
	Prunus pensylvanica	pin cherry [PS]
	Prunus serotina	black cherry [AA, PS]
	Prunus virginiana	chokecherry [AA, PS]
	Rosa carolina	Carolina rose [AA, PS]
	*Rosa multiflora**	multiflora rose [AA, PS]
	Rosa palustris	swamp rose [PS]
	Rubus allegheniensis	Allegheny blackberry [AA, PS]
	Rubus flagellaris	northern dewberry [AA, PS]
	Rubus hispidus	bristly dewberry [AA, PS]
	Rubus idaeus	American red raspberry
	Rubus occidentalis	black raspberry [AA]
	Spiraea alba var. *latifolia*	white meadowsweet [AA, PS]
	Spiraea tomentosa	steeplebush [AA, PS]
Rubiaceae	*Cephalanthus occidentalis*	common buttonbush [AA, PS]
	Galium aparine	Stickywilly [AA]
	Galium circaezans	licorice bedstraw [AA]
	*Galium mollugo**	false baby's breath [AA, PS]
	Galium palustre	common marsh bedstraw [AA, PS]
	Galium tinctorium	stiff marsh bedstraw [AA]
	Galium triflorum	fragrant bedstraw [AA]
	Mitchella repens	partridgeberry [AA, PS]
Rutaceae	*Zanthoxylum americanum*	common pricklyash [PS]
Salicaceae	*Populus deltoides*	eastern cottonwood [AA, PS]
	Populus grandidentata	bigtooth aspen [AA, PS]
	Populus tremuloides	quaking aspen [AA, PS]

Table D-1. List of plant species observed during Vegetation Inventory of Saratoga National Historical Park (continued).

Family	Scientific Name	Common Name
Salicaceae (cont.)	*Salix alba**	white willow [AA, PS]
	Salix lucida	shining willow [PS]
	Salix nigra	black willow
Scrophulariaceae	*Linaria vulgaris**	butter and eggs [AA, PS]
	Melampyrum lineare	narrowleaf cowwheat [AA]
	Mimulus ringens	Allegheny monkeyflower [AA, PS]
	Penstemon digitalis	talus slope penstemon [AA, PS]
	*Verbascum thapsus**	common mullein [PS]
	*Veronica officinalis**	common gypsyweed [AA, PS]
	Veronica serpyllifolia+	thymeleaf speedwell [AA]
Simaroubaceae	*Ailanthus altissima**	tree of heaven [AA]
Solanaceae	*Datura stramonium**	jimsonweed [AA]
	*Solanum dulcamara**	climbing nightshade [PS]
Sparganiaceae	*Sparganium eurycarpum*	broadfruit bur-reed [AA, PS]
Thelypteridaceae	*Phegopteris hexagonoptera*	broad beechfern [AA, PS]
	Thelypteris noveboracensis	New York fern [AA, PS]
	Thelypteris palustris	eastern marsh fern [AA, PS]
Tiliaceae	*Tilia americana*	American basswood [AA, PS]
Trapaceae	*Trapa natans**	water chestnut [PS]
Typhaceae	*Typha angustifolia*	narrowleaf cattail [AA]
	Typha latifolia	broadleaf cattail [AA, PS]
Ulmaceae	*Celtis occidentalis*	common hackberry [PS]
	Ulmus americana	American elm [AA, PS]
Urticaceae	*Boehmeria cylindrica*	smallspike false nettle [AA, PS]
	Laportea canadensis	Canadian woodnettle [AA, PS]
	Pilea pumila	Canadian clearweed [AA, PS]
	Urtica dioica	stinging nettle [AA, PS]
Verbenaceae	*Verbena hastata*	swamp verbena [AA, PS]
	Verbena urticifolia	white vervain [AA]
Violaceae	*Viola cucullata*	marsh blue violet [AA, PS]
	Viola rotundifolia	roundleaf yellow violet
Vitaceae	*Parthenocissus quinquefolia*	Virginia creeper [AA, PS]
	Vitis aestivalis	summer grape [AA, PS]
	Vitis riparia	riverbank grape [AA, PS]

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York

The vegetation association field keys prepared for SARA have been divided into five individual dichotomous keys to vegetation associations and a primary key to select one of the five association keys to aid the user. The divisions are based primarily on physiognomy (Forest and Woodland, Shrubland, and Herbaceous Vegetation) and upland versus wetland habitat. The broad field key divisions are: (1) Upland Woody Vegetation; (2) Open Upland Vegetation; (3) Wetland Forests; (4) Wetland Shrublands; and (5) Herbaceous Wetlands.

A "KEY TO THE KEYS"

The following five keys have been divided into manageable portions to facilitate their use in the field. It is, however, important that you have the correct key! Please refer to the following primary key to choose the appropriate physiognomic/habitat key.

1. Vegetation primarily woody (trees or tall shrubs dominant; canopy closed (forest or shrubland) to open (woodland or shrubland). Includes forests, woodlands, and upland shrublands)...(go to 2)

2. Forests and shrublands of uplands…..…….**Upland Woody Vegetation Key (UW)**

2. Forests and shrublands of wetlands……. ……..……(go to 3)

3. Forested wetland community, includes swamps, floodplain forests……

…….……**Wetland Forests Key (WF)**

3. Shrub-dominated wetland community…….**Wet Shrublands Key (WS)**

1. Vegetation primarily herbaceous or sparse vascular……..……..……(go to 4)

4. Herbaceous vegetation of uplands ……..…**Open Upland Vegetation Key (UO)**

4. Herbaceous vegetation of wetlands (emergent and submerged)……

…….**Herbaceous Wetlands Key (WH)**

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York (continued).

UPLAND WOODY VEGETATION KEY

This key includes woody vegetation that is dominated by trees or shrubs; it includes forests, open woodlands and shrub thickets on uplands.

UW1. Forests dominated by coniferous trees (evergreen trees >50% cover), deciduous trees < 20-25% of the total canopy cover.....(go to UW2)

UW2. Coniferous forests dominated by eastern white pine (*Pinus strobus*).....(go to UW3)

UW3. Trees in obvious rows; eastern white pine-dominated plantations.....**White Pine Plantation (CEGL007178)**

[=*Pinus strobus* Planted Forest; =Eastern White Pine Planted Forest]

UW3. Trees not in obvious rows. Eastern white pine forests of greater diversity; mixed with other conifers or hardwoods.....(go to UW4)

UW4. Forest dominated by eastern white pine, often in an emergent canopy layer, with abundant eastern hemlock (*Tsuga canadensis*) in the canopy and subcanopy.....**White Pine – Hemlock Dry-Mesic Forest (CEGL006328)**

[=*Pinus strobus* - *Tsuga canadensis* Lower New England / Northern Piedmont Forest; =Eastern White Pine - Eastern Hemlock Lower New England / Northern Piedmont Forest]

UW4. Forest dominated by eastern white pine with hardwood species.....(go to UW5)

UW5. Forest canopy co-dominated by eastern white pine and either sugar maple (*Acer saccharum*) or red maple (*Acer rubrum*).....(go to UW6)

UW6. Canopy co-dominated by eastern white pine and sugar maple with hophornbeam (*Ostrya virginiana*) in the subcanopy.....**Northern Hardwood - White Pine Forest (CEGL005005)**

[=*Acer saccharum* - *Pinus strobus* / *Acer pensylvanicum* Forest; =Sugar Maple - Eastern White Pine / Striped Maple Forest]

UW6. Canopy co-dominated by eastern white pine and red maple. Northern red oak (*Quercus rubra*) usually present.....**Northeastern Oak - Red Maple Successional Forest (CEGL006506)**

[=Northeastern *Quercus* spp. – *Acer rubrum* Successional Forest; =Northeastern Oak – Red Maple Successional Forest]

UW5. Forest dominated by eastern white pine with either oak species (*Quercus* spp.) or mixed hardwoods. Maple species (*Acer* spp.) can be present but not dominant.....(go to UW7)

UW7. Forest dominated by eastern white pine and oak species, especially northern red oak (*Quercus rubra*), white oak (*Quercus alba*), black oak (*Quercus velutina*), and scarlet oak (*Quercus coccinea*). American beech *(Fagus grandifolia*) and hophornbeam (*Ostrya virginiana*) are also common and abundant……**White Pine - Oak Forest (CEGL006293)**
[=*Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia* Forest;
=Eastern White Pine - (Northern Red Oak, Black Oak) - American Beech Forest]

UW7. Early successional forests strongly dominated by eastern white pine with lesser amounts of mixed hardwood associates, including American elm (*Ulmus americana*), red maple, sugar maple, black cherry (*Prunus serotina*), and white ash (*Fraxinus americana*). Occurs in a variety of environmental settings……..……**White Pine Successional Forest (CEGL007944)**
[=*Pinus strobus* Successional Forest; =Eastern White Pine Successional Forest]

UW2. Coniferous forests dominated by eastern hemlock or Norway spruce (*Picea abies*)…(go to UW8)

UW8. Conifer forests dominated by Norway spruce with trees in obvious rows; a Norway spruce-dominated plantation……..…….....….**Norway Spruce Plantation (CEGL007167)**
[=*Picea abies* Planted Forest; =Norway Spruce Planted Forest]

UW8. Coniferous forests dominated or co-dominated by eastern hemlock (*Tsuga canadensis*)……
……..……..…..……..……..…..……..……..…..……..……..…..……..……..…..…..(go to UW9)

UW9. Eastern hemlock forest with a strong component of or co-dominated by eastern white pine. Coniferous trees >75% of canopy cover; eastern hemlock usually with greater relative cover than eastern white pine……**White Pine - Hemlock Dry-Mesic Forest (CEGL006328)**
[=*Pinus strobus - Tsuga canadensis* Lower New England / Northern Piedmont Forest;
=Eastern White Pine - Eastern Hemlock Lower New England / Northern Piedmont Forest]

UW9. Eastern hemlock forest co-dominated by deciduous hardwood trees. Coniferous trees usually <75% of canopy cover…….……..……..(go to UW10)

UW10. Mixed hemlock-hardwood forest with a strong component of northern hardwood species, especially sugar maple (*Acer saccharum*). Lacks a significant presence of oak species (*Quercus* spp.), eastern white pine, or sweet birch (*Betula lenta*) ……..……...
……..……..…**Hemlock - Northern Hardwood Forest (CEGL006109)**
[=*Tsuga canadensis - Betula alleghaniensis - Acer saccharum / Dryopteris intermedia* Forest;
=Eastern Hemlock - Yellow Birch - Sugar Maple / Intermediate Woodfern Forest]

UW10. Mixed hemlock-hardwood forest with a strong component of northern red oak (*Quercus rubra*) and additional associated oak species and/or sweet birch; sugar maple and yellow birch (*Betula alleghaniensis*) are rare; sites are generally drier than other eastern hemlock forests……
……..……**Hemlock - Beech - Oak Forest (CEGL006088)**
[=*Tsuga canadensis - Fagus grandifolia - Quercus rubra* Forest;
=Eastern Hemlock - American Beech - Northern Red Oak Forest]

UW1. Forest or shrubland dominated by deciduous trees or a mix of deciduous and evergreen species: deciduous trees > 25% of the total canopy cover……..(go to UW11)

UW11. Forests dominated by oak species (*Quercus* spp.) with oaks making up at least 50% of canopy cover; can be co-dominated by or associated with hickory species (*Carya* spp.)…….…….(go to UW12)

UW12. Mixed conifer-deciduous forests, oak species co-dominant with conifers, which have >25% cover…..……...……..……..……..……..(go to UW13)

UW13. Oak species forests with eastern white pine co-dominant. Forest dominated by eastern white pine and oak species, especially northern red oak (*Quercus rubra*), white oak (*Quercus alba*), black oak (*Quercus velutina*), and scarlet oak (*Quercus coccinea*). American beech *(Fagus grandifolia*) and hophornbeam (*Ostrya virginiana*) are also common and abundant……...
……..……..…**White Pine - Oak Forest (CEGL006293)**
[=*Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia* Forest;
=Eastern White Pine - (Northern Red Oak, Black Oak) - American Beech Forest]

UW13. Oak species forest with eastern hemlock (*Tsuga canadensis*) co-dominant. Mixed hemlock-hardwood forest with a strong component of northern red oak and additional associated oak species and/or sweet birch (*Betula lenta*). Sugar maple (*Acer saccharum*) and yellow birch (*Betula alleghaniensis*) are rare; sites are generally drier than other hemlock forests..……
…….....**Hemlock - Beech - Oak Forest (CEGL006088)**
[=*Tsuga canadensis - Fagus grandifolia - Quercus rubra* Forest;
=Eastern Hemlock - American Beech - Northern Red Oak Forest]

UW12. Oak (*Quercus* spp.) forests with conifers much less frequent (<25% cover), may be co-dominated by other deciduous trees…….……..……..……..…(go to UW14)

UW14. Enriched, upland oak species forests with frequent and sometimes abundant enrichment indicators in canopy [(pignut hickory (*Carya glabra*), shagbark hickory (*Carya ovata*), sugar maple (*Acer saccharum*), American basswood (*Tilia americana*), white ash (*Fraxinus americana*), hophornbeam (*Ostrya virginiana*)] and/or herb [white baneberry (*Actaea pachypoda*), Pennsylvania sedge (*Carex pensylvanica*), Robert geranium (*Geranium robertianum*), hepatica (*Hepatica nobilis*)] layers..…....…….……..……...…….……...……..(go to UW15)

UW15. Enriched oak species (*Quercus* spp.) forests without abundant hickory species (*Carya* spp.); dominated by northern red oak (*Quercus rubra*) with sugar maple and/or white ash common..……..**Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)**
[=*Acer saccharum - Quercus rubra / Hepatica nobilis* var. *obtusa* Forest;
=Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest]

UW15. Enriched oak species forests with abundant hickory species (*Carya* spp.). Hickories comprise 10-20% of canopy cover…….…….……..……..……..(go to UW16)

UW16. Oak-hickory forests with a subcanopy characterized by hophornbeam and a park-like lawn of Pennsylvania sedge……..…… ……...…….. **Dry, Rich Oak - Hickory Forest (CEGL006301 (sedge lawn variant)**
[=*Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum* Forest; =Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest]

UW16. Oak -hickory forests lacking park-like sedge (*Carex* spp.) lawn. Hophornbeam and Pennsylvania sedge are present, but not abundantly…….…... ……**Dry, Rich Oak - Hickory Forest (CEGL006301 (typic expression))**
[=*Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum* Forest; =Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest]

UW14. Oak forests lacking significant cover of enrichment indicators. Hickories (*Carya* spp.) may be present, but with low abundance……..…….…….……...……..(go to UW17)

UW17. Oak species forest of uplands……..……..(go to UW18)
UW18. Forest occurring on talus slopes with a stunted, open canopy of scarlet oak (*Quercus coccinea*) and eastern white pine in the tall shrub layer…….……..… …….....**Shale Talus Slope Woodland (CEGL006074)**
[=*Quercus prinus / Rhus* spp. / *Deschampsia flexuosa* Woodland; =Chestnut Oak / Sumac species / Wavy Hairgrass Woodland]

UW18. Forest not on talus slopes…..……..……..…….……..……..(go to UW19)

UW19. Mixed oak species forest dominated by scarlet oak and white oak (*Quercus alba*) largely without hickory species. Flowering dogwood (*Cornus florida*) characteristic when present….……**Northeastern Dry Oak - Hickory Forest (CEGL006336)**
[=*Quercus (alba, rubra, velutina) - Carya* spp. / *Viburnum acerifolium* Forest; =(White Oak, Northern Red Oak, Black Oak) / Hickory species / Mapleleaf Viburnum Forest]

UW19. Northern red oak (*Quercus rubra*) forest with strong component of northern hardwood species, including sugar maple and American beech *(Fagus grandifolia*)..…….. …….……**Red Oak - Northern Hardwood Forest (CEGL006173)**
[=*Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium* Forest; =Northern Red Oak - Sugar Maple - American Beech / Mapleleaf Viburnum Forest]

UW17. Oak species forests of transitional zones between uplands and wetlands…..(go to UW20)

UW20. Transitional oak species forest dominated by red maple (*Acer rubrum*) with northern red oak (*Quercus rubra*). Cinnamon fern (*Osmunda cinnamomea*) and interrupted fern (*Osmunda claytoniana*) are characteristic herbs..…… …….……..…….**Upland/Wetland Transitional Forest (CEGL006000)**
[=*Quercus rubra - Betula alleghaniensis / Osmunda cinnamomea* Forest;

=Northern Red Oak - Yellow Birch / Cinnamon Fern Forest]

UW20. Transitional or, more often, palustrine oak species forest strongly dominated by swamp white oak (*Quercus bicolor*)……**Swamp White Oak Floodplain Forest (CEGL006386)**
[=*Quercus bicolor - Acer rubrum / Carpinus caroliniana* Forest;
=Swamp White Oak - Red Maple / American Hornbeam Forest]

UW11. Forests or shrublands not dominated by oak species; (oaks may be present but not abundant in the canopy); common canopy species include red maple (*Acer rubrum*), aspen species (*Populus* spp.) or northern hardwoods such as sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis)*, and American beech (*Fagus grandifolia*)..……. ..……...……..(go to UW21)

UW21. Early successional, deciduous forests and shrublands dominated by a mix of species, including Tatarian honeysuckle (*Lonicera tatarica*), common buckthorn (*Rhamnus cathartica*), and gray dogwood (*Cornus racemosa*); red maple, black cherry (*Prunus serotina*), and black locust (*Robinia pseudoacacia*); or shade-intolerant trees with wind-dispersed seeds like aspen species……
……...……..……..……..……..……..(go to UW22)

UW22. Successional shrublands dominated by Tatarian honeysuckle, common buckthorn, and gray dogwood. Scattered canopy trees can include ash species (*Fraxinus* spp.) and elm species (*Ulmus* spp.); herbaceous species are typically those associated with old fields, grasslands, and agricultural sites……..……**Northeastern Successional Shrubland (CEGL006451)**
[=*Lonicera tatarica – Rhamnus cathartica – Cornus racemosa* Successional Shrubland;
=Tatarian Honeysuckle – Common Buckthorn – Gray Dogwood Successional Shrubland]
UW22. Early to mid-successional forests and woodlands…….……..……..(go to UW23)

UW23. Early-successional forests dominated by aspen species or by black locust. Canopy varies from closed forest to open woodland.…….……..…..……..…..……..……..(go to UW24)

UW24. Canopy dominated by quaking aspen (*Populus tremuloides*) and bigtooth aspen (*Populus grandidentata*)…...……..…**Early-Successional Woodland/Forest (CEGL006303)**
[=*Populus (tremuloides, grandidentata)* Early-Successional Forest;
=(Quaking, Bigtooth) Aspen Early-Successional Forest]

UW24. Canopy dominated by black locust..**Black Locust Successional Forest (CEGL007279)**
[=*Robinia pseudoacacia* Successional Forest; =Black Locust Successional Forest]

UW23. Mid-successional forests with an open to closed canopy dominated by either red maple with eastern white pine (*Pinus strobus*) or by a variable mix that can include black cherry, white ash (*Fraxinus americana*),American elm (*Ulmus americana*), and red maple…..…(go to UW25)

UW25. Forest co-dominated by red maple and eastern white pine. Northern red oak (*Quercus rubra*) usually present...**Northeastern Oak - Red Maple Successional Forest (CEGL006506)**
[=*Quercus rubra - Acer rubrum - Betula* spp. - *Pinus strobus* Forest;

=Northern Red Oak - Red Maple - Birch species - Eastern White Pine Forest]

UW25. Forest dominated by a variable mix that includes black cherry, white ash,American elm, and red maple…..…….**Northeastern Modified Successional Forest (CEGL006599)**

[=*Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus Americana* Forest;
=Black Cherry – Tulip Tree – Red Maple – Green Ash Forest]

UW21. Not as above; late successional forests……..…..…..……..……..……..(go to UW26)

UW26. Forests with enrichment indicators in the canopy [sugar maple, American basswood (*Tilia americana*), white ash (*Fraxinus americana*), hophornbeam (*Ostrya virginiana*), hickory species] and/or herb [northern maidenhair (*Adiantum pedatum*), white baneberry (*Actaea pachypoda*), roundleaf yellow violet (*Viola rotundifolia*), hepatica (*Hepatica nobilis*), broadleaf sedge (*Carex platyphylla*), Robert geranium (*Geranium robertianum*)] layers…..…..……..……..(go to UW27)

UW27. Enriched northern hardwood forests with a strong component of oak species with 25-50% cover……...……..…….…..……..……..(go to UW28)

UW28. Sugar maple-oak forests dominated by northern red oak (*Quercus rubra*) with white ash common, lacks abundant hickory species...……...
……...**Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)**

[=*Acer saccharum - Quercus rubra / Hepatica nobilis* var. *obtusa* Forest;
=Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest]

UW28. Sugar maple-oak forests with abundant hickory species. Hickory species comprise 10-20% of canopy cover…...……...……..…….…..……..……..(go to UW29)

UW29. Oak-hickory forests with a subcanopy characterized by hophornbeam and a park-like lawn of Pennsylvania sedge (*Carex pennsylvanica*)..…….
..……...……. **Dry, Rich Oak - Hickory Forest (CEGL006301 (sedge lawn variant)**

[=*Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum* Forest;
=Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest]

UW29. Oak -hickory forests lacking park-like sedge (*Carex* spp.) lawn. Hophornbeam and Pennsylvania sedge are present, but not abundantly……...……
……..……... **Dry, Rich Oak - Hickory Forest (CEGL006301 (typic expression))**

[=*Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum* Forest;
=Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest]

UW27. Enriched northern hardwood forests without abundant oak species; oak species are present but in low abundance…...…..…..…..……..…..……..…..……..……..(go to UW30)

UW30. Sugar maple dominated forest occurring on a high floodplain terrace with a strong component of black cherry. Associates include white ash, northern red oak, and red maple; herb layer dominated by garlic mustard (*Alliaria petiolata*)……..……
…….……..…**Terrace Hardwood Floodplain Forest(CEGL006114)**
[=*Acer saccharum* - *Fraxinus* spp. - *Tilia americana / Matteuccia struthiopteris* - *Ageratina altissima* Forest;
=Sugar Maple - Ash species - American Basswood / Ostrich Fern - White Snakeroot Forest]

UW30. Sugar maple dominated forest not occurring on a floodplain terrace. Canopy associates include white ash, American beech, American basswood; white oak (*Quercus alba*) and scarlet oak (*Quercus coccinea*) are present in lesser amounts. Rich indicators such as northern maidenhair, white baneberry, and broadleaf sedge are present..……
……..…..……**Semi-rich Northern Hardwood Forest (CEGL006211)**
[=*Acer saccharum* - *(Fraxinus americana) / Arisaema triphyllum* Forest;
=Sugar Maple - (White Ash) / Jack-in-the-Pulpit Forest]

UW26. Forests not as above; northern hardwoods dominant but enrichment indicators lacking……..…..…..……..…..……..…..……..……..(go to UW31)

UW31. Northern hardwood forests with 25-50% conifer cover in the canopy….(go to UW32)

UW32. Northern hardwood forest dominated by sugar maple with lesser amounts of eastern white pine (*Pinus strobus*) in the canopy and associates that include hophornbeam, white oak (*Quercus alba*), black cherry, and white ash..……..……..……
…….……..……**Northern Hardwood - White Pine Forest (CEGL005005)**
[=*Acer saccharum* - *Pinus strobus / Acer pensylvanicum* Forest;
=Sugar Maple - Eastern White Pine / Striped Maple Forest]

UW32. Northern hardwood forests with significant eastern hemlock (*Tsuga canadensis*) in the canopy..……...…..……..…..……..…..……..……..(go to UW33)

UW33. Mixed hemlock-hardwood forest with a strong component of northern hardwood species, especially sugar maple, yellow birch, and American beech; lacking a significant presence of oak species, eastern white pine, or sweet birch (*Betula lenta*)……..…
……..……..**Hemlock - Northern Hardwood Forest (CEGL006109)**
[=*Tsuga canadensis* - *Betula alleghaniensis* - *Acer saccharum / Dryopteris intermedia* Forest;
=Eastern Hemlock - Yellow Birch - Sugar Maple / Intermediate Woodfern Forest]

UW33. Mixed hemlock-hardwood forest with a strong component of American beech and/or a common occurrence of oak species and/or sweet birch; sites generally drier than other eastern hemlock forests…….**Hemlock - Beech - Oak Forest (CEGL006088)**
[=*Tsuga canadensis* - *Fagus grandifolia* - *Quercus rubra* Forest;
=Eastern Hemlock - American Beech - Northern Red Oak Forest]

UW31. Northern hardwood forests with deciduous associates in the canopy, conifers sparse or absent..……(go to UW34)

UW34. Forests with only a minor component of oak species. The canopy is dominated by American beech with black cherry, sugar maple, white ash, northern red oak (*Quercus rubra*), and shagbark hickory (*Carya ovata*)..……**Beech – Maple Glaciated Forest (CEGL005013)**
[=*Fagus grandifolia - Acer saccharum* Glaciated Midwest Forest;
=American Beech - Sugar Maple Glaciated Midwest Forest]

UW34. Forests with a significant component of oak species..…….……(go to UW35)

UW35. Forest transitional between upland and wetland; dominated by red maple with associated northern red oak. Cinnamon fern (*Osmunda cinnamomea*) and interrupted fern (*Osmunda claytoniana*) are characteristic herbs…..... …….…….……..… ……**Upland/Wetland Transitional Forest (CEGL006000)**
[=*Quercus rubra - Betula alleghaniensis / Osmunda cinnamomea* Forest;
=Northern Red Oak - Yellow Birch / Cinnamon Fern Forest]

UW35. Upland forest co-dominated by sugar maple and northern red oak with lesser amounts of American beech..……**Northern Red Oak - Northern Hardwood Forest (CEGL006173)**
[=*Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium* Forest;
=Northern Red Oak - Sugar Maple - American Beech / Mapleleaf Viburnum Forest]

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York (continued).

WETLAND FORESTS KEY

This key includes vegetation commonly known as forested swamps and floodplain forests.

WF1. Floodplain/riparian forests on alluvial soils of low or high terraces of riverbanks..……(go to WF2)

WF2. Floodplain forest canopy dominated or co-dominated by silver maple (*Acer saccharinum*) and/or sugar maple (*Acer saccharum*)……..…..…..… ……..……..…..…..… ……..……..…..…..…(go to WF3)

WF3. Floodplain forest canopy dominated by sugar maple and occurring on a high floodplain terrace with a strong component of black cherry (*Prunus serotina*). Associates include white ash (*Fraxinus americana)*, northern red oak (*Quercus rubra*), and red maple (*Acer rubrum*); herb layer dominated by garlic mustard (*Alliaria petiolata*)……**Terrace Hardwood Floodplain Forest (CEGL006114)**
[=*Acer saccharum - Fraxinus* spp. - *Tilia americana / Matteuccia struthiopteris - Ageratina altissima* Forest;
=Sugar Maple - Ash species - American Basswood / Ostrich Fern - White Snakeroot Forest]

WF3. Floodplain forest canopy dominated or co-dominated by silver maple.……...…….(go to WF4)

WF4. Floodplain forest dominated by eastern cottonwood (*Populus deltoides*) with canopy associates that include silver maple, green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), American sycamore (*Platanus occidentalis*), and swamp white oak (*Quercus bicolor*). Common understory species are deertongue (*Dichanthelium clandestinum*), garlic mustard, Canadian clearweed (*Pilea pumila*), creeping jenny (*Lysimachia nummularia*), smallspike false nettle (*Boehmeria cylindrica*), jewelweed (*Impatiens capensis*), giant goldenrod (*Solidago gigantea*), and white snakeroot (*Ageratina altissima* var. *altissima*). It is generally associated with coarse soils and relatively short flood duration..…… …..……..**Silver Maple Floodplain Levee Forest (CEGL006147)**
[=*Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis* Forest;
=Silver Maple - (Eastern Cottonwood) / Ostrich Fern - Canadian Wood-nettle Forest]

WF4. Silver maple floodplain forest with sensitive fern (*Onoclea sensibilis*) and/or smallspike false nettle prominent in the understory; often associated with fine soils and relatively long flood duration.……..……(go to WF5)

WF5. Floodplain forest strongly dominated by silver maple in the canopy and subcanopy with large, widely-spaced canopy trees, sparse shrubs, and a lush ground layer with sensitive fern, reed canarygrass (*Phalaris arundinacea*), creeping jenny, and smallspike false nettle……. ……...……...**Silver Maple / Sensitive Fern Floodplain Forest** (**CEGL006176)**
[=*Acer saccharinum / Onoclea sensibilis - Boehmeria cylindrica* Forest;
=Silver Maple / Sensitive Fern - Small-spike False Nettle Forest]

WF5. Floodplain forest dominated by silver maple with white willow (*Salix alba*), green ash, and American elm (*Ulmus americana*) as associates. Creeping jenny is the most abundant species in the dense herbaceous layer..…….**Silver Maple - Elm Floodplain Forest (CEGL006001)**

[=*Acer saccharinum - Ulmus americana / Onoclea sensibilis* Forest;
=Silver Maple - American Elm / Sensitive Fern Forest]

WF2. Canopy dominants otherwise..…….(go to WF6)

WF6. Early successional floodplain woodland/forest with an open canopy and subcanopy dominated by boxelder (*Acer negundo*) with white willow occurring as an associate in the canopy. The dense (85-90% cover) herbaceous layer is strongly dominated by ostrich fern (*Matteuccia struthiopteris*)… ……**Boxelder Floodplain Forest (CEGL005033)**
[=*Acer negundo* Forest; =Box-elder Forest]

WF6. Floodplain forests of lower energy rivers with more poorly-drained soils; canopy dominance otherwise)..……..…..…..…..… ….…..…..…..…..… ….…..…..…..…..…(go to WF7)

WF7. Floodplain forests dominated by green ash with enrichment indicators including black walnut (*Juglans nigra*) and American basswood (*Tilia americana*)……..……..……..…..…..…. ….……**Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)**
[=*Fraxinus pennsylvanica - (Juglans nigra, Platanus occidentalis)* Forest;
=Green Ash - (Black Walnut, American Sycamore) Forest]

WF7. Community dominated by either eastern cottonwood (*Populus deltoides*) or swamp white oak (*Quercus bicolor*)…..…..……..……..…..……..……..…..… ……..……..……..…(go to WF8)

WF8. Floodplain forest dominated by eastern cottonwood with canopy associates that include silver maple, green ash (*Fraxinus pennsylvanica*), bitternut hickory (*Carya cordiformis*), American sycamore (*Platanus occidentalis*), and swamp white oak. Common understory species are deertongue (*Dichanthelium clandestinum*), garlic mustard, Canadian clearweed (*Pilea pumila*), creeping jenny (*Lysimachia nummularia*), smallspike false nettle (*Boehmeria cylindrica*), jewelweed (*Impatiens capensis*), giant goldenrod (*Solidago gigantea*), and white snakeroot (*Ageratina altissima* var. *altissima*). It is generally associated with coarse soils and relatively short flood duration..……S**ilver Maple Floodplain Levee Forest (CEGL006147)**
[=*Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis* Forest;
=Silver Maple - (Eastern Cottonwood) / Ostrich Fern - Canadian Wood-nettle Forest]

WF8. Floodplain forest dominated by swamp white oak in the canopy and subcanopy layers. Sensitive fern (*Onoclea sensibilis*) is strongly dominant in the understory...…...…..…..…… ……..**Swamp White Oak Floodplain Forest (CEGL006386)**
[=*Quercus bicolor - Acer rubrum / Carpinus caroliniana* Forest;
=Swamp White Oak - Red Maple / American Hornbeam Forest]

WF1. Wet forests not on a floodplain; forests of basins, saturated slopes, or other lowlands....(go to WF9)

WF9. Forested seeps dominated by skunk cabbage (*Symplocarpus foetidus*). Canopy similar to that of surrounding upland forest.....……**Skunk Cabbage – Jewelweed Seep (CEGL006567)**

[=*Symplocarpus foetidus - Impatiens capensis* Herbaceous Vegetation;
=Skunk-cabbage - Orange Jewelweed Herbaceous Vegetation]

WF9. Forested swamps characterized by hardwoods)..…..…..… …..…..…..…..…..…..…(go to WF10)

WF10. Hardwood forested swamps characterized by dominance of green ash (*Fraxinus pennsylvanica*) in the tree canopy, subcanopy, and tall shrub layers. Reed canarygrass (*Phalaris arundinacea*) and hop sedge (*Carex lupulina*) are dominant in the dense understory…..……..…
……..…**Elm - Ash / Skunk Cabbage Swamp (CEGL006966)**
[=*Ulmus rubra - Fraxinus pennsylvanica - Betula alleghaniensis / Cornus amomum / Symplocarpus foetidus* Forest;
=Slippery Elm – Green Ash – Yellow Birch / Silky Dogwood / Skunk Cabbage Forest]

WF10. Hardwood forested swamps characterized by red maple (*Acer rubrum*)..……(go to WF11)

WF11. The tree canopy of this association is strongly dominated by red maple with scattered individuals of American elm. Groundwater seepage (although not very enriched) is evidenced by presence of sensitive fern (*Onoclea sensibilis*) and skunk cabbage in the understory……
……..…..……**Southern New England Red Maple Seepage Swamp (CEGL006406)**
[=*Acer rubrum - Fraxinus (pennsylvanica, americana) / Lindera benzoin / Symplocarpus foetidus* Forest;
=Red Maple - (Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest]

WF11. The open tree canopy and subcanopy layers of this woodland association are dominated by red maple with lesser amounts of quaking aspen (*Populus tremuloides*), green ash, and gray birch (*Betula populifolia*). Maleberry (*Lyonia ligustrina*) is the most abundant tall shrub and lake sedge (*Carex lacustris*) is dominant in the herbaceous layer…..……
…….…..…….. ……..……**Red Maple - Lake Sedge Wooded Marsh (CEGL006105)**
[=*Acer rubrum / Carex lacustris* Woodland;
=Red Maple / Lake Sedge Woodland]

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York (continued).

WET SHRUBLANDS KEY

This key contains vegetation commonly known as shrub swamps.

WS1. Shrub vegetation characterized by co-dominance of white meadowsweet (*Spiraea alba* var. *latifolia*) and maleberry (*Lyonia ligustrina*)……..…
……**Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)**
[=*Spiraea tomentosa* - *Rubus* spp. / *Phalaris arundinacea* Shrubland;
=Steeplebush - Blackberry species / Reed Canarygrass Shrubland]

WS1. Shrub vegetation characterized by common buttonbush (*Cephalanthus occidentalis)*, or alders (*Alnus* spp.); habitat variable - low basins, pondshores, streamsides, riversides……..…(go to WS2)

WS2. Tall shrub wetlands dominated by alder species (*Alnus* spp.); palustrine association characterized by a predominance of speckled alder (*Alnus incana* ssp. *rugosa*) in the shrub and subcanopy layers……
……**Speckled Alder Swamp (CEGL002381)**
[=*Alnus incana* Swamp Shrubland; =Gray Alder Swamp Shrubland]

WS2. Shrub wetlands dominated by common buttonbush (*Cephalanthus occidentalis*) which is the dominant and characteristic tall and short shrub, accompanied by shining willow (*Salix lucida*) and common winterberry (*Ilex verticillata*) in both tall and short shrub layers and by speckled alder in the tall shrub layer and hazel alder (*Alnus serrulata*) in the short shrub layer..……..
……..**Common Buttonbush Shrub Swamp (CEGL006069)**
[=*Cephalanthus occidentalis* - *Decodon verticillatus* Shrubland;
=Common Buttonbush - Swamp-loosestrife Shrubland]

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York (continued).

OPEN UPLAND VEGETATION KEY

This key includes natural and semi-natural upland vegetation (vegetation that grows spontaneously without human management) that is primarily treeless. It includes a variety of habitats: rock outcrops, cliffs, old fields, and vernal pools that are dominated largely by herbaceous vegetation or lichens. Scattered stunted trees may be present.

UO1. Natural community on talus slopes or shale cliffs dominated by poverty oatgrass (*Danthonia spicata*) in the herbaceous layer..……(go to UO2)

UO2. Vegetation of talus slopes, characterized by poverty oatgrass (*Danthonia spicata*) with a stunted, open canopy of scarlet oak (*Quercus coccinea*) and eastern white pine (*Pinus strobus*)……..…
……..……..……..……..…**Shale Talus Slope Woodland (CEGL006074)**
[=*Quercus prinus / Rhus* spp. / *Deschampsia flexuosa* Woodland;
=Chestnut Oak / Sumac species / Wavy Hairgrass Woodland]

UO2. Vegetation of sparsely vegetated shale cliffs characterized by poverty oatgrass (*Danthonia spicata*) with scattered staghorn sumac (*Rhus typhina*) shrubs……
……..……**Temperate Shale Cliffs and Talus (CEGL006535)**
[=*Penstemon hirsutus* Sparse Vegetation; =Hairy Beardtongue Sparse Vegetation]

UO1. Natural community not on talus slopes or shale cliffs……(go to UO3)

UO3. Successional vegetation dominated by a mix of herbs and graminoids or by ferns...…(go to UO4)

UO4. Successional meadow dominated by ferns, primarily cinnamon fern (*Osmunda cinnamomea*), sensitive fern (*Onoclea sensibilis*), eastern marsh fern (*Thelypteris palustris*), common ladyfern (*Athyrium filix-femina*), and interrupted fern (*Osmunda claytoniana*). Short shrubs include sweet fern (*Comptonia peregrina*), Allegheny blackberry (*Rubus allegheniensis*), white meadowsweet (*Spiraea alba* var. *latifolia*), bristly dewberry (*Rubus hispidus*), northern dewberry (*Rubus flagellaris*), and steeplebush (*Spiraea tomentosa*)……..……**Bracken Grassland (CEGL005142)**
[=*Pteridium aquilinum - Bromus kalmii* Herbaceous Vegetation;
=Bracken Fern - Kalm's Brome Herbaceous Vegetation]

UO4. Successional fields dominated by a mix of herbs and graminoids..……(go to UO5)

UO5. Vegetation is characterized and dominated by little bluestem (*Schizachyrium scoparium*) with consistent associates early goldenrod (*Solidago juncea*), spotted knapweed (*Centaurea stoebe* ssp. *micranthos*), gray goldenrod (*Solidago nemoralis*), and flat-top goldenrod (*Euthamia graminifolia*)..……..…**Little Bluestem Old Field (CEGL006333)**
[=*Schizachyrium scoparium* Old Field; =Little Bluestem Old Field]

UO5. Vegetation is dominated by non-native, early successional grasses and herbs on abandonned pasture and post-agricultural fields. The vegetation of these old fields is quite variable from one site to the next. The most characteristic and consistent species are brownray knapweed (*Centaurea jacea*), Kentucky bluegrass (*Poa pratensis*), false baby's breath (*Galium mollugo*), Canada goldenrod (*Solidago canadensis*), wrinkleleaf goldenrod (*Solidago rugosa*), smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), flat-top goldenrod (*Euthamia graminifolia*), and common milkweed (*Asclepias syriaca*) with numerous associates…**Northeastern Old Field (CEGL006107)**

[=*Bromus inermis – Poa pratensis - Dactylis glomerata - Phleum pratense - Solidago* spp. Semi-natural Herbaceous Vegetation;
=Smooth Brome – Kentucky Bluegrass - Orchardgrass – Timothy – Goldenrod species Semi-natural Herbaceous Vegetation]

UO3. Sparse vegetation of forested vernal pools, characterized by fluctuating water levels as well as the presence of a suite of invertebrate and amphibian species, including fingernail clams, wood frogs, and spotted salamanders. Herbaceous species are dominated by cinnamon fern (*Osmunda cinnamomea*) with lesser amounts of royal fern (*Osmunda regalis*) and smallspike false nettle (*Boehmeria cylindrica*)…..……**Eastern Woodland Vernal Pool (CEGL006453)**

[=*Osmunda (cinnamomea, regalis) - Boehmeria cylindrica* Herbaceous Vegetation;
=(Cinnamon Fern, Royal Fern) – Smallspike False Nettle Herbaceous Vegetation)]

Appendix E: Dichotomous Field Keys to Plant Communities at Saratoga National Historical Park, New York (continued).

HERBACEOUS WETLANDS KEY

This key includes vegetation commonly known as marshes, as well as other vegetation occurring in naturally small patches in wetlands.

WH1. Herbaceous vegetation of river shores influenced by flood scour exposing rock, cobble, or other mineral substrate. Riverside grasslands characterized by hairyfruit sedge (*Carex trichocarpa*), generally on gravel or sand substrates along high-gradient sections of rivers; vegetation may be sparse and compositions fairly diverse; stunted, battered shrubs and tree saplings may occur at low cover……..…….. ……..…..……..…**Hairyfruit Sedge Wetland (CEGL006447)**
[=*Carex trichocarpa* Herbaceous Vegetation; =Hairy-fruit Sedge Herbaceous Vegetation]

WH1. Herbaceous wetlands not associated with rivers, or with small or slow-moving rivers that deposit, rather than scour away, organic material…...……..…..……..…..……..…..……..…..……..…(go to WH2)

WH2. Forested seeps dominated by skunk cabbage (*Symplocarpus foetidus*). Canopy similar to that of surrounding upland forest……**Skunk Cabbage - Jewelweed Seep (CEGL006567)**
[=*Symplocarpus foetidus – Impatiens capensis* Herbaceous Vegetation; =Skunk Cabbage – Orange Jewelweed Herbaceous Vegetation]

WH2. Open wetlands not as above. Communities of freshwater marshes, including submerged vegetation; soils typically organic, often deep. Emergent marsh vegetation; majority of plants above water (although floating-leaved plants may be a component)…..……..…..……..……..…(go to WH3)

WH3. Freshwater marsh dominated by graminoids (slender-leaved plants, including grasses, sedges, rushes, cattails, etc……..…...……..…..……..…..……..…..……..…..……..…(go to WH4)

WH4. Freshwater marshes dominated or characterized by bluejoint (*Calamagrostis canadensis*) or lake sedge (*Carex lacustris*)…...…...……..…..……..…..……..…..……..…..……..…(go to WH5)

WH5. Vegetation dominated by bluejoint with shrubs lacking or sparse. Wet meadows dominated or co-dominated by bluejoint and several associates, such as bulrushes (*Scirpus* spp., *Schoenoplectus* spp.). Shrubs often common although generally have <25% cover…… ……**Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)**
[=*Calamagrostis canadensis - Scirpus* spp. - *Dulichium arundinaceum* Herbaceous Vegetation; =Bluejoint - Bulrush species - Threeway Sedge Herbaceous Vegetation]

WH5. Vegetation characterized by lake sedge, which occurs with abundant sensitive fern (*Onoclea sensibilis*)..……**Lake Sedge Wet Meadow (CEGL002256)**
[*Carex lacustris* Herbaceous Vegetation; Lake Sedge Herbaceous Vegetation]

WH4. Freshwater marshes not dominated nor characterized by bluejoint or lake sedge.…….…… ……..(go to WH6)

WH6. Freshwater marsh dominated by cattails (*Typha* spp.) or bulrushes (*Scirpus* spp.)…….……

….……..(go to WH7)

WH7. Vegetation dominated by woolgrass (*Scirpus cyperinus*)……..…
……**Woolgrass Marsh (CEGL006349)**
[=*Scirpus cyperinus* Seasonally Flooded Herbaceous Vegetation;
=Woolgrass Bulrush Seasonally Flooded Herbaceous Vegetation]

WH7. Vegetation dominated by broadleaf cattail (*Typha latifolia*)……
……**Eastern Cattail Marsh (CEGL006153)**
[=*Typha (angustifolia, latifolia) - (Schoenoplectus* spp.) Eastern Herbaceous Vegetation;
=(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Eastern Herbaceous Vegetation]

WH6. Freshwater marsh not dominated by cattails or bulrushes……..(go to WH8)

WH8. Freshwater marsh dominated by annual wildrice (*Zizania aquatica*) or cutgrass (*Leersia* spp.)……....(go to WH9)

WH9. Vegetation dominated by annual wildrice……..…**Wild Rice Marsh (CEGL002382)**
[=*Zizania (aquatica, palustris)* Herbaceous Vegetation;
=(Annual Wild Rice, Northern Wild Rice) Herbaceous Vegetation]

WH9. Vegetation dominated by rice cutgrass (*Leersia oryzoides*) with green bulrush (*Scirpus atrovirens*) and jewelweed occurring as fairly consistent associates……
……**Rice Cutgrass - Fowl Mannagrass Wet Meadow CEGL005106)**
[=*Leersia oryzoides - Glyceria striata - (Schoenoplectus* spp., *Impatiens capensis)* Herbaceous Vegetation;
=Rice Cutgrass - Fowl Mannagrass - (Clubrush species, Orange Jewelweed) Herbaceous Vegetation]

WH8. Freshwater marsh dominated by reed canarygrass (*Phalaris arundinacea*) or common reed (*Phragmites australis*) to the exclusion of other species.……..(go to WH10)

WH10. Marsh dominated by reed canarygrass……
……..**Reed Canarygrass Eastern Marsh CEGL006044)**
[=*Phalaris arundinacea* Eastern Herbaceous Vegetation;
=Reed Canarygrass Eastern Herbaceous Vegetation]

WH10. Marsh dominated by common reed..……...**Common Reed Marsh (CEGL004141)**
[=*Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation;
=Common Reed Eastern North America Temperate Semi-natural Herbaceous Vegetation]

WH3. Freshwater marsh dominated by broad-leaved emergent herbs.……..(go to WH11)

WH11. Vegetation of ponds with permanent, standing water……..……..(go to WH12)

WH12. Vegetation dominated by broadfruit bur-reed (*Sparganium eurycarpum*) and green arrow arum (*Peltandra virginica*)…..…….**Northeastern Leafy Forb Marsh (CEGL006191)**
[=*Pontederia cordata - Peltandra virginica - Sagittaria latifolia* Herbaceous Vegetation; =Pickerelweed - Green Arrow-arum - Broadleaf Arrowhead Herbaceous Vegetation

WH12. Vegetation dominated by common duckweed (*Lemna minor*)…..……..……..
……..…..……..**Common Duckweed Herbaceous Vegetation (CEGL003305)**
[=*Lemna minor* Herbaceous Vegetation; =Common Duckweed Herbaceous Vegetation]

WH11. Vegetation of marshes without permanent, standing water…...……..(go to WH13)

WH13. Association dominated by the invasive, exotic purple loosestrife (*Lythrum salicaria*)…..…
……..…..……..…….**Purple Loosestrife Wetland (CEGL006403)**
[=*Lythrum salicaria* Herbaceous Vegetation [Provisional]; =Purple Loosestrife Herbaceous Vegetation [Provisional]

WH13. Association dominated by either sensitive fern (*Onoclea sensibilis*) with lake sedge (*Carex lacustris*) or by spotted joepyeweed (*Eupatorium maculatum*) with sensitive fern and a diverse mix of varied herbs……...…...……...……...(go to WH14)

WH14. Vegetation characterized by sensitive fern with lake sedge…...…….…...……...……
……..…..……..……**Lake Sedge Wet Meadow (CEGL002256)**
[=*Carex lacustris* Herbaceous Vegetation; =Lake Sedge Herbaceous Vegetation]

WH14. Vegetation characterized by spotted joepyeweed with sensitive fern and a diverse mix of varied herbs..…..……..…**Mixed Forb Marsh (CEGL006446)**
[=*Eupatorium maculatum - Onoclea sensibilis – Thelypteris palustris* – Mixed Forbs Herbaceous Vegetation;
=Spotted Joepyeweed – Sensitive Fern – Eastern Marsh Fern – Mixed Forbs Herbaceous Vegetation

Appendix F: Local and global descriptions of vegetation associations

Vascular plant species nomenclature within the local and global descriptions follows the nationally standardized list of Kartesz (1999), with very few exceptions. This nomenclature differs from PLANTS 3.5 Database (USDA NRCS 2004) in only a very few cases, and when this difference occurs, synonymy is indicated parenthetically in the local description information. Nomenclature for nonvascular plants follows Anderson (1990) and Anderson et al. (1990) for mosses, Egan (1987, 1989, 1990, 1991) and Esslinger and Egan (1995) for lichens, and Stotler and Crandall-Stotler (1977) for liverworts/hornworts. English names for associations and alliances use NatureServe Central Ecology-accepted names and may differ slightly from PLANTS 3.5 Database (USDA NRCS 2004) common names that are used within the local description information and throughout the rest of the report. Sources cited in the local and global vegetation descriptions are included in the literature section at the end of this appendix. Representative photographs of the vegetation types are provided after the descriptions when available.

INTERNATIONAL ECOLOGICAL CLASSIFICATION STANDARD:

TERRESTRIAL ECOLOGICAL CLASSIFICATIONS

Associations of

Saratoga National Historical Park

28 September 2007

(edited by Cogan Technology, Inc. to reflect USNVC hierarchy as of 12 December 2013)

by

NatureServe

1101 Wilson Blvd., 15th floor

Arlington, VA 22209

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Boston, MA 02111-1736

This subset of the International Ecological Classification Standard covers vegetation associations attributed to Saratoga National Historical Park. This classification has been developed in consultation with many individuals and agencies and incorporates information from a variety of publications and other classifications. Comments and suggestions regarding the contents of this subset should be directed to Mary J. Russo, Central Ecology Data Manager, Durham, NC <mary_russo@natureserve.org> and Lesley A. Sneddon, Senior Regional Ecologist, Boston, MA <lesley_sneddon@natureserve.org>.

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Canada
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Appendix F: Local and global descriptions of vegetation associations (continued).

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Local Name: Shale Talus Slope Woodland (CEGL006074)

SYNONYMS

USNVC English Name: **Northern Red Oak - Chestnut Oak - Eastern White Pine / Hairy Beardtongue Woodland**

USNVC Scientific Name: ***Quercus rubra - Quercus prinus - Pinus strobus / Penstemon hirsutus* Woodland**

USNVC Identifier: **CEGL006074**

LOCAL INFORMATION

Environmental Description: This shale talus slope woodland occurs in one location at Saratoga on a steep south/southwest-facing slope between 61 and 76 m (200-250 feet) in elevation. The thin soil is silt loam in the Hudson series (NRCS 2004), and the underlying bedrock (shale and sandstone in the Canajoharie Formation) contributes talus that is exposed at the surface. The woodland occurs in tight association with Temperate Shale Cliffs and Talus (CEGL006535). Hemlock - Beech - Oak Forest (CEGL006088) covers the adjacent slopes, and there is cropland and pasture just upslope.

Vegetation Description: Vegetation of this dry, talus community varies from almost absent to sparse, depauperate woodland. The open, somewhat stunted (15 m tall) tree canopy has 40% cover and is dominated by *Quercus coccinea* (scarlet oak). Tall and short shrubs are relatively sparse, with 12% and 15% cover, respectively. *Pinus strobus* (eastern white pine) is the most abundant tall shrub with lesser amounts of *Acer rubrum* (red maple); *Betula lenta* (sweet birch) is the most abundant species in the short-shrub layer. Herbaceous species are more dense, with 40% cover, and occur patchily depending on canopy closure. *Danthonia spicata* (poverty oatgrass) is the most abundant species with associates that include *Antennaria howellii* (Howell's pussytoes) and *Deschampsia flexuosa* (wavy hairgrass).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus coccinea* (scarlet oak)
Tall shrub/sapling	Needle-leaved shrub	*Pinus strobus* (eastern white pine)
Short shrub/sapling	Broad-leaved deciduous shrub	*Betula lenta* (sweet birch)
Herb (field)	Forb	*Antennaria howellii* (Howell's pussytoes)
Herb (field)	Graminoid	*Danthonia spicata* (poverty oatgrass), *Deschampsia flexuosa* (wavy hairgrass)

Characteristic Species: *Antennaria howellii* (Howell's pussytoes), *Betula lenta* (sweet birch), *Danthonia spicata* (poverty oatgrass), *Pinus strobus* (eastern white pine), *Quercus coccinea* (scarlet oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S3	=	1	Shale talus slope woodland	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park.
Classification Comments: This association represents the woodland on the margin of a small shale cliff at Saratoga National Historical Park.
Other Comments: The one polygon (0.5 acre) that is labeled as this woodland association also contains Temperate Shale Cliffs and Talus (CEGL006535). The two are so finely interdigitated that they were not separated for mapping.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: None
Accuracy Assessment Observations: SARA.184 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Central Oak-Hardwood and Pine Forest (M012)
Group	Appalachian Oak - Chestnut Forest Group (G015)
Alliance*	*Quercus rubra - Quercus prinus* Woodland Alliance (A.624)
Alliance (English name)*	Northern Red Oak - Chestnut Oak Woodland Alliance
Association	*Quercus rubra - Quercus prinus - Pinus strobus / Penstemon hirsutus* Woodland
Association (English name)	Northern Red Oak - Chestnut Oak - Eastern White Pine / Hairy Beardtongue Woodland
Ecological System(s)	Central Appalachian Pine-Oak Rocky Woodland (CES202.600)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association comprises shale talus woodlands currently described in New York. Slopes are relatively unstable with shallow, very well-drained, dry soils. Tree canopy is generally less than 50% cover, and characteristic species include *Quercus prinus* (chestnut oak), *Carya glabra* (pignut hickory), *Quercus rubra* (northern red oak), *Quercus alba* (white oak), *Pinus strobus* (eastern white pine), *Fraxinus americana* (white ash), and *Juniperus virginiana* (eastern redcedar). Characteristic shrubs and herbs include *Rhus glabra* (smooth sumac), *Quercus prinoides* (dwarf chinkapin oak), *Toxicodendron radicans* (eastern poison ivy), *Penstemon hirsutus* (hairy beardtongue), *Antennaria plantaginifolia* (woman's tobacco), and *Carex pensylvanica* (Pennsylvania sedge).
Environmental Description: Unstable shale talus with shallow, very well-drained soils.
Vegetation Description: Information not available.
Most Abundant Species: Information not available.
Characteristic Species: Information not available.

Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable
DISTRIBUTION
Range: Currently described only from New York.
States/Provinces: NY:S3
Federal Lands: NPS (Saratoga)
CONSERVATION STATUS
Rank: G3G5 (1-Dec-1997)
Reasons: Information not available.
CLASSIFICATION INFORMATION
Status: Standard
Confidence: Low.
Comments: Information not available.
Similar Associations:
Penstemon hirsutus Sparse Vegetation (CEGL006535)
Related Concepts:
SNE circumneutral rocky summit/rock outcrop community (Rawinski 1984) ?
SNE dry central hardwood forest on acidic bedrock or till (Rawinski 1984) B
SOURCES
Description Authors: S.L. Neid
References: Eastern Ecology Working Group n.d., Edinger et al. 2002, NRCS 2004, Rawinski 1984



Figure F-1. Shale Talus Slope Woodland in the Saratoga Battlefield Unit (AA point SARA.184, NYNHP 368). 9/20/2006. NAD 1983 / UTM easting 610485, northing 4759232.

Local Name: Dry, Rich Oak - Hickory Forest (CEGL006301)

SYNONYMS

U.S. NVC English Name:	**Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest**
U.S. NVC Scientific Name:	***Quercus rubra* - *Carya* (*glabra, ovata*) / *Ostrya virginiana* / *Carex lucorum* Forest**
U.S. NVC Identifier:	**CEGL006301**

LOCAL INFORMATION

Environmental Description: This oak-hickory forest occurs at elevations ranging from 30 to 107 m (100-350 feet) on high flats and gentle to steep slopes with variable aspect. Soils are shallow to very deep, poorly drained to somewhat excessively drained loamy fine sands, channery silt loams, rocky channery silt loams, silt loams, loamy fine sand, and gravelly loamy sands in the Oakville, Manlius-Nassau complex, Bernardston, Nassau-Rock outcrop complex, Fluvaquents, Allis, and Hudson series (NRCS 2004). The underlying bedrock is shale, siltstone, and sandstone in the Mt. Merino and Canajoharie formations. Adjacent communities include Northeastern Oak - Red Maple Successional Forest (CEGL006506), White Pine Successional Forest (CEGL007944), Early-Successional Woodland/Forest (CEGL006303), Northeastern Modified Successional Forest (CEGL006599), White Pine Plantation (CEGL007178), Northeastern Successional Shrubland (CEGL006451), White Pine - Oak Forest (CEGL006293), Hemlock - Beech - Oak Forest (CEGL006088), Little Bluestem Old Field (CEGL006333), Semi-rich Northern Hardwood Forest (CEGL006211), Common Duckweed Herbaceous Vegetation (CEGL005451), and Swamp White Oak Floodplain Forest (CEGL006386), and cropland.

Vegetation Description: The tree canopy is somewhat closed (70-75% cover) and is codominated by oaks and hickories, including *Quercus rubra* (northern red oak), *Quercus alba* (white oak), *Carya glabra* (pignut hickory) and *Carya ovata* (shagbark hickory), with lesser amounts of *Quercus coccinea* (scarlet oak) and *Carya cordiformis* (bitternut hickory). Associates are *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), *Fagus grandifolia* (American beech), *Tilia americana* (American basswood), *Betula lenta* (sweet birch), *Pinus strobus* (eastern white pine), *Prunus serotina* (black cherry), *Fraxinus pennsylvanica* (green ash), *Fraxinus americana* (white ash), and *Populus tremuloides* (quaking aspen). Canopy trees are 20-25 m tall, and subcanopy trees reach 10-15 m in height with 40-50% cover. The subcanopy consists of many of the same species listed above, with the additions of *Ostrya virginiana* (hophornbeam), *Ulmus americana* (American elm), *Amelanchier arborea* (common serviceberry), *Rhamnus cathartica* (common buckthorn), *Fagus grandifolia* (American beech), *Magnolia acuminata* (cucumber-tree), *Carpinus caroliniana* (American hornbeam), *Castanea dentata* (American chestnut), and *Quercus bicolor* (swamp white oak). Tall shrubs (15-25% cover) include saplings of the species listed above and *Hamamelis virginiana* (American witchhazel), *Lonicera tatarica* (Tatarian honeysuckle), *Rubus allegheniensis*

(Allegheny blackberry), *Zanthoxylum americanum* (common pricklyash), *Viburnum dentatum* (southern arrowwood), and *Cornus racemosa* (gray dogwood). Additional species present in the short-shrub layer (15-25% cover) are *Viburnum acerifolium* (mapleleaf viburnum), *Zanthoxylum americanum* (common pricklyash), *Rubus flagellaris* (northern dewberry), *Rubus allegheniensis* (Allegheny blackberry), *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium angustifolium* (lowbush blueberry), *Corylus americana* (American hazelnut), *Rosa multiflora* (multiflora rose), *Ribes glandulosum* (skunk currant), and *Viburnum lentago* (nannyberry). Common, but scattered, vines are *Parthenocissus quinquefolia* (Virginia creeper), *Vitis aestivalis* (summer grape), and *Toxicodendron radicans* (eastern poison ivy).

The diverse herbaceous layer (35-45% cover) includes *Amphicarpaea bracteata* (American hogpeanut), *Pilea pumila* (Canadian clearweed), *Carex pensylvanica* (Pennsylvania sedge), *Elymus hystrix* (eastern bottlebrush grass), *Leersia virginica* (whitegrass), *Podophyllum peltatum* (mayapple), *Impatiens capensis* (jewelweed), *Alliaria petiolata* (garlic mustard), *Onoclea sensibilis* (sensitive fern), *Cinna latifolia* (drooping woodreed), *Solidago nemoralis* (gray goldenrod), *Galium circaezans* (licorice bedstraw), *Oxalis stricta* (common yellow oxalis), *Elymus virginicus* (Virginia wildrye), *Symphyotrichum lateriflorum* (calico aster), *Aralia nudicaulis* (wild sarsaparilla), *Ageratina altissima var. altissima* (white snakeroot), *Galium triflorum* (fragrant bedstraw), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Maianthemum canadense* (Canada mayflower), *Euthamia graminifolia* (flat-top goldentop), *Trientalis borealis* (starflower), *Aquilegia canadensis* (red columbine), *Circaea alpina* (small enchanter's nightshade), *Penstemon digitalis* (talus slope penstemon), *Prunella vulgaris* (common selfheal), *Melampyrum lineare* (narrowleaf cowwheat), *Potentilla simplex* (common cinquefoil), *Plantago major* (common plantain), *Polygonum virginianum* (jumpseed), *Solidago canadensis* (Canada goldenrod), *Thelypteris palustris* (eastern marsh fern), *Solidago rugosa* (wrinkleleaf goldenrod), *Fragaria virginiana* (Virginia strawberry), *Brachyelytrum erectum* (bearded shorthusk), *Scirpus atrovirens* (green bulrush), *Mitchella repens* (partridgeberry), *Arisaema triphyllum* (Jack in the pulpit), *Solidago caesia* (wreath goldenrod), *Eurybia macrophylla* (bigleaf aster), *Athyrium filix-femina* (common ladyfern), *Desmodium glutinosum* (pointedleaf ticktrefoil), *Actaea pachypoda* (white baneberry), *Hypericum perforatum* (common St. Johnswort), *Polystichum acrostichoides* (Christmas fern), and *Geranium maculatum* (spotted geranium), among others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Carya ovata* (shagbark hickory)
Tree canopy	Broad-leaved deciduous tree	*Quercus alba* (white oak), *Quercus rubra* (northern red oak), *Quercus coccinea* (scarlet oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Carya glabra* (pignut hickory), *Fagus*

		grandifolia (American beech), *Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fagus grandifolia* (American beech)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hamamelis virginiana* (American witchhazel), *Rhamnus cathartica* (common buckthorn), *Zanthoxylum americanum* (common pricklyash)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood), *Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Rubus allegheniensis* (Allegheny blackberry), *Viburnum acerifolium* (mapleleaf viburnum)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Amphicarpaea bracteata* (American hogpeanut), *Pilea pumila* (Canadian clearweed)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge), *Elymus hystrix* (eastern bottlebrush grass), *Leersia virginica* (whitegrass)

Characteristic Species: *Acer saccharum* (sugar maple), *Ageratina altissima* var. *altissima* (white snakeroot), *Amphicarpaea bracteata* (American hogpeanut), *Carex pensylvanica* (Pennsylvania sedge), *Carya ovata* (shagbark hickory), *Elymus hystrix* (eastern bottlebrush grass), *Hamamelis virginiana* (American witchhazel), *Leersia virginica* (whitegrass), *Ostrya virginiana* (hophornbeam), *Quercus alba* (white oak), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Appalachian oak-hickory forest	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.12, SARA.21, SARA.56, SARA.84, SARA.89, SARA.166, SARA.168, SARA.180, SARA.181

Accuracy Assessment Observations: SARA.12 (AA), SARA.24 (AA), SARA.49 (AA), SARA.68 (AA), SARA.75 (AA), SARA.111 (AA), SARA.150 (AA), SARA.187 (AA)

Reference Observations: SARA.231, SARA.239
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

U.S. NVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Central Oak-Hardwood and Pine Forest (M012)
Group	Northeastern and North-Central Oak-Hickory Forest Group (G158)
Alliance*	*Carya (glabra, ovata) - Fraxinus americana - Quercus (alba, rubra)* Forest Alliance (A.258)
Alliance (English name)*	(Pignut Hickory, Shagbark Hickory) - White Ash - (White Oak, Northern Red Oak) Forest Alliance
Association	*Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum* Forest
Association (English name)	Northern Red Oak - (Pignut Hickory, Shagbark Hickory) / Hophornbeam / Blue Ridge Sedge Forest
Ecological System(s)	Northeastern Interior Dry-Mesic Oak Forest (CES202.592) Central Appalachian Pine-Oak Rocky Woodland (CES202.600) Central Appalachian Alkaline Glade and Woodland (CES202.602)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association is a dry, rich oak-hickory forest of the northeastern United States, occurring from Maine and Vermont to Pennsylvania and northern New Jersey. It is dominated by a mixture of hickories and oaks over a hop-hornbeam subcanopy with or without a parklike sedge lawn. The vegetation occurs on low-elevation ridgetops, upper slopes, south- or west-facing sideslopes, and is supported by well-drained loams or sandy loams, often derived from alkaline bedrock. The tree canopy, which ranges from nearly closed forest to partially open woodland, is dominated by a mixture of *Carya glabra, Carya ovata, Carya ovalis, Quercus rubra, Quercus alba, Quercus velutina*, with occasional *Ostrya virginiana* and *Acer rubrum*. Minor associates include *Acer saccharum, Pinus strobus*, and *Fraxinus americana*. A subcanopy of *Ostrya virginiana* is conspicuous in most areas. Additional species in the subcanopy or tall-shrub layer that occur in lower abundance can include *Hamamelis virginiana, Cornus florida, Amelanchier arborea, Acer pensylvanicum*, and *Viburnum acerifolium*. Low shrubs can include *Vaccinium angustifolium, Vaccinium pallidum, Rubus idaeus*, or *Viburnum rafinesquianum*. The herb layer can range from a sedge lawn of *Carex lucorum*, with some *Carex pensylvanica, Carex woodii, Carex appalachica*, or *Carex rosea*, to a more patchy herbaceous layer with sedges in addition to scattered *Elymus hystrix, Bromus pubescens, Ageratina altissima, Festuca subverticillata, Uvularia perfoliata, Aralia nudicaulis, Maianthemum racemosum (= Smilacina racemosa), Desmodium glutinosum, Desmodium paniculatum, Prenanthes alba, Solidago bicolor, Hepatica nobilis var. obtusa (= Hepatica americana), Carex* (Laxiflorae group), *Deschampsia flexuosa, Packera paupercula (= Senecio pauperculus), Packera obovata (= Senecio obovatus), Symphyotrichum undulatum (= Aster undulatus), Symphyotrichum patens (= Aster patens), Polystichum acrostichoides*, and

Dichanthelium spp. Spring ephemerals such as *Erythronium americanum* and *Claytonia virginica* also occur in some portions of the range.

Environmental Description: This community occupies upper slopes and sideslopes at low elevations, generally with southeastern to western exposures. The low relief of southern New England limits this vegetation to small occurrences, most of which are <4 ha (10 acres). Soils are well-drained loams or sandy loams and often circumneutral. Soils are often stony, but exposed bedrock, boulders, cobbles, and mineral soil are sparse.

Vegetation Description: This forest has a closed to open canopy dominated by a mixture of *Carya glabra, Carya ovata, Carya ovalis, Quercus rubra, Quercus alba, Quercus velutina*, with occasional *Ostrya virginiana, Quercus prinus, Carya alba*, and *Acer rubrum*. Minor associates include *Acer saccharum, Pinus strobus*, and *Fraxinus americana*. A subcanopy of *Ostrya virginiana* is conspicuous in most areas. Additional species in the subcanopy or tall-shrub layers that occur in lower abundance include *Hamamelis virginiana, Cornus florida, Amelanchier arborea, Acer pensylvanicum*, and *Viburnum acerifolium*. Low shrubs can include *Vaccinium angustifolium, Vaccinium pallidum, Gaylussacia baccata, Rubus allegheniensis, Rubus idaeus, Viburnum dentatum*, or *Viburnum rafinesquianum*. *Vaccinium stamineum* may be present in the most southerly (NJ/PA) occurrences of this association. The herb layer can range from a sedge lawn of *Carex lucorum*, with some *Carex pensylvanica, Carex woodii, Carex appalachica*, or *Carex rosea*, to a more patchy herbaceous layer with sedges in addition to scattered *Elymus hystrix, Bromus pubescens, Danthonia spicata, Anthoxanthum odoratum, Ageratina altissima, Festuca subverticillata, Uvularia perfoliata, Aralia nudicaulis, Maianthemum racemosum (= Smilacina racemosa), Desmodium glutinosum, Desmodium paniculatum, Prenanthes alba, Solidago bicolor, Solidago juncea, Hepatica nobilis var. obtusa (= Hepatica americana), Carex* spp. (Laxiflorae group), *Deschampsia flexuosa, Packera paupercula (= Senecio pauperculus), Packera obovata (= Senecio obovatus), Symphyotrichum undulatum (= Aster undulatus), Symphyotrichum patens (= Aster patens), Veronica officinalis, Polystichum acrostichoides*, and *Dichanthelium* spp. Spring ephemerals such as *Erythronium americanum* and *Claytonia virginica* also occur in some portions of the range.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Carya ovata* (shagbark hickory), *Carya glabra* (pignut hickory), *Carya ovalis* (red hickory), *Quercus alba* (white oak), *Quercus prinus* (chestnut oak), *Quercus rubra* (northern red oak), *Quercus velutina* (black oak) and *Amelanchier arborea* (downy serviceberry)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Carpinus caroliniana* (American hornbeam), *Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Crateagus spathulata* (littlehip hawthorn)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge), *Carex lucorum* (Blue Ridge sedge), *Carex rosea* (rosy sedge), *Carex lucorum* (Blue Ridge sedge), *Deschampsia flexuosa* (wavy hairgrass), *Elymus hystrix* (bottlebrush grass)

Herb (field)	Forb	*Ageratina altissima* var. *altissima* (white snakeroot), *Maianthemum racemosum* (feathery false lily of the valley), *Potentilla canadensis* (Canada cinquefoil), *Potentilla simplex* (common cinquefoil), *Solidago bicolor* (white goldenrod), *Solidago juncea* (early goldenrod), *Uvularia perfoliata* (perfoliate bellwort)

Characteristic Species: *Carya ovata* (shagbark hickory), *Carya glabra* (pignut hickory), *Carya ovalis* (red hickory), *Quercus alba* (white oak), *Quercus prinus* (chestnut oak), *Quercus rubra* (northern red oak), *Quercus velutina* (black oak), *Amelanchier arborea* (common serviceberry), *Carex pensylvanica* (Pennsylvania sedge), *Carex lucorum* (Blue Ridge sedge), *Carex rosea* (rosy sedge), *Carex lucorum* (Blue Ridge sedge), *Deschampsia flexuosa* (wavy hairgrass), *Elymus hystrix* (bottlebrush grass), *Maianthemum racemosum* (feathery false lily of the valley), *Potentilla canadensis* (Canada cinquefoil), *Potentilla simplex* (common cinquefoil), *Solidago bicolor* (white goldenrod), *Solidago juncea* (early goldenrod), *Uvularia perfoliata* (perfoliate bellwort)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable.

DISTRIBUTION

Range: This forest occurs in the Lower New England - Northern Piedmont, Central Appalachians, Western Allegheny Plateau, and High Allegheny Plateau ecoregions.
States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT
Federal Lands: NPS (Roosevelt-Vanderbilt, Upper Delaware)

CONSERVATION STATUS

Rank: G4 (apparently secure) (20-May-2011)
Reasons: This association is a large-patch to matrix-forming forest association of the northeastern U.S. There are likely to be over 1000 occurrences of this vegetation, with approximately half of those having good ecological integrity. The association is ranked G4 rather than G5 because it has declined up to 30% over the long term, and continues to be threatened by residential and commercial development, invasive species, and repeated gypsy moth infestations. The impact of climate change is not currently known.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: The former *Carya (glabra, ovata)* - *Fraxinus americana* - *Quercus* spp. Forest (CEGL006236) was lumped into this community in 2009 allowing for oak-hickory without sedge lawn stands to be included in this type (CEGL006301). Both expressions are present at SARA, with the former CEGL006236 (the typic expression) more prevalent than the former [narrow sense] concept of CEGL006301 (the “sedge lawn” variant).
Similar Associations:

- *Quercus alba* - *Quercus prinus* - *Carya glabra / Cornus florida / Vaccinium pallidum* Forest (CEGL008515)

- *Quercus prinus - Quercus rubra - Carya ovalis / Carex pensylvanica – (Calamagrostis porteri)* Forest (CEGL008516)

Related Concepts:

- Pignut hickory – White ash (*Carya glabra – Fraxinus americana*) forests (Metzler and Barrett 2006) >
- Oak - Hickory Forest (Gawler 2002) >
- Hickory – Hop Hornbeam Forest / Woodland (Swain and Kearsley 2001) =
- Red Oak – Ironwood – Pennsylvania Sedge Lawn (Sperduto and Nichols 2004) =
- *Quercus rubra - Carya (galbra, ovata) / Ostrya virginiana / Carex pensylvanica* Forest (Breden et al. 2001) =
- Appalachian Oak - Hickory Forest (Edinger et al. 2002) >
- Dry Oak – Mixed Hardwood Forest (Fike 1999) >
- Oak - Hickory Forest (Enser 1999) >
- Dry Oak - Hickory – Hophornbeam Forest (Thompson and Sorenson 2002) =

SOURCES

Description Authors: G. Fleming and P. Coulling, mod. S.L. Neid and S. Gawler

References: Breden 1989, Breden et al. 2001, CAP pers. comm. 1998, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Eyre 1980, Fike 1999, Fleming et al. 2001, Fleming and Coulling 2001, Fleming and Morehead 2000, Gawler 2002, Harrison 2004, Lundgren 2000, Lundgren 2001, Metzler and Barrett 2001, Metzler and Barrett 2004, NRCS 2004, Rawinski 1984, Rawinski et al. 1996, Sperduto 2000a, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000, Vanderhorst 2000b, Virginia Division of Natural Heritage 2003



Figure F-2. Dry, Rich Oak - Hickory Forest (typic expression) in the Old Saratoga Unit (plot SARA.181, NYNHP EE3, photo no. 673). 9/22/2004. NAD 1983 / UTM easting 614671, northing 4772123.



Figure F-3. Dry, Rich Oak - Hickory Forest (Sedge Lawn variant) in the Saratoga Battlefield Unit (AA point SARA.49, NYNHP 99). 8/23/2006. NAD 1983 / UTM easting 613052, northing 4762091.

Local Name: Northeastern Dry Oak - Hickory Forest (CEGL006336)

SYNONYMS

USNVC English Name:	**(White Oak, Northern Red Oak, Black Oak) / Flowering Dogwood / Mapleleaf Viburnum Forest**
USNVC Scientific Name:	***Quercus (alba, rubra, velutina) / Cornus florida / Viburnum acerifolium* Forest**
USNVC Identifier:	**CEGL006336**

LOCAL INFORMATION

Environmental Description: This dry oak-hickory forest occurs most often on high, level hilltops and mid to low southeast-facing slopes at elevations ranging from 30 to 88 m (100-290 feet). Soils are very deep, moderately well-drained to somewhat poorly drained loamy fine sands and silt loams in the Oakville, Hudson, and Rhinebeck series (NRCS 2004); the underlying bedrock is sandstone and shale in the Canajoharie Formation. Most frequently, adjacent natural communities are White Pine Successional Forest (CEGL007944), Northeastern Modified Successional Forest (CEGL006599), White Pine - Oak Forest (CEGL006293), Hemlock - Beech - Oak Forest (CEGL006088), and Northeastern Old Field (CEGL006107).

Vegetation Description: The tree canopy (between 20 and 30 m tall with 60% cover) of this association is dominated by *Quercus coccinea* (scarlet oak) and *Quercus alba* (white oak) with *Betula lenta* (sweet birch), *Fagus grandifolia* (American beech), and *Acer rubrum* (red maple). The subcanopy (between 15 and 20 m tall with 40-45% cover) is dominated by *Fagus grandifolia* (American beech) and *Acer rubrum* (red maple) with *Carya glabra* (pignut hickory), *Ostrya virginiana* (hophornbeam), *Quercus rubra* (northern red oak), and *Betula lenta* (sweet birch). The sparse tall-shrub layer, with 15% cover, is dominated by *Hamamelis virginiana* (American witchhazel) with lesser amounts of *Ostrya virginiana* (hophornbeam) and *Amelanchier arborea* (common serviceberry). Short shrubs are more abundant (25% cover) and include *Viburnum acerifolium* (mapleleaf viburnum), ericaceous species *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium corymbosum* (highbush blueberry), *Vaccinium angustifolium* (lowbush blueberry), *Gaultheria procumbens* (eastern teaberry), and seedlings of the species listed above. Ferns are dominant in the herbaceous layer, which has 30-35% cover. Common species are *Osmunda cinnamomea* (cinnamon fern), *Athyrium filix-femina* (common ladyfern), *Osmunda regalis* (royal fern), *Onoclea sensibilis* (sensitive fern), and *Thelypteris palustris* (eastern marsh fern) with *Scirpus cyperinus* (woolgrass), *Carex pensylvanica* (Pennsylvania sedge), *Amphicarpaea bracteata* (American hogpeanut), *Carex lupulina* (hop sedge), *Mitchella repens* (partridgeberry), *Juncus effusus* (common rush), *Trientalis borealis* (starflower), and *Uvularia sessilifolia* (sessileleaf bellwort) as associates.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech)

Tree canopy	Broad-leaved deciduous tree	*Betula lenta* (sweet birch), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Carya glabra* (pignut hickory), *Ostrya virginiana* (hophornbeam), *Quercus rubra* (northern red oak)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hamamelis virginiana* (American witchhazel)
Short shrub/sapling	Broad-leaved deciduous shrub	*Gaylussacia baccata* (black huckleberry), *Viburnum acerifolium* (mapleleaf viburnum)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge), *Scirpus cyperinus* (woolgrass)
Herb (field)	Fern or fern ally	*Athyrium filix-femina* (common ladyfern), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern)

Characteristic Species: *Betula lenta* (sweet birch), *Carex pensylvanica* (Pennsylvania sedge), *Carya glabra* (pignut hickory), *Gaylussacia baccata* (black huckleberry), *Hamamelis virginiana* (American witchhazel), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Viburnum acerifolium* (mapleleaf viburnum)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	I	1	Appalachian oak-hickory forest	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit of Saratoga National Historical Park and also extends onto the mapped area outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: SARA.109 (AA), SARA.199 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)

Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Central Oak-Hardwood and Pine Forest (M012)
Group	Northeastern and North-Central Oak-Hickory Forest Group (G158)
Alliance*	*Quercus alba - (Quercus rubra, Carya* spp.) Forest Alliance (A.239)
Alliance (English name)*	White Oak - (Northern Red Oak, Hickory species) Forest Alliance
Association	*Quercus (alba, rubra, velutina) / Cornus florida / Viburnum acerifolium* Forest
Association (English name)	(White Oak, Northern Red Oak, Black Oak) / Flowering Dogwood / Mapleleaf Viburnum Forest
Ecological System(s)	Northeastern Interior Dry-Mesic Oak Forest (CES202.592) Central Appalachian Dry Oak-Pine Forest (CES202.591)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This oak-hickory forest occurs on well-drained loamy sand of midslopes in the northeastern United States. This vegetation is ecologically transitional between dry-rich oak-hickory forests of relatively high diversity and dry, acidic oak species-poor forests. *Quercus rubra* (northern red oak), *Quercus alba* (white oak), and *Quercus velutina* (black oak) are prominent in the canopy. *Quercus prinus* (chestnut oak) and *Quercus coccinea* (scarlet oak) are canopy associates in the southern portion of the range. Typical hickory species include *Carya glabra* (pignut hickory), *Carya ovata* (shagbark hickory), *Carya alba* (mockernut hickory), and *Carya ovalis* (red hickory). Other canopy associates may include *Acer rubrum* (red maple), *Sassafras albidum* (sassafras), and *Amelanchier arborea* (common serviceberry). At the northern range limit of this type, *Pinus strobus* (eastern white pine) and *Betula lenta* (sweet birch) also occur as minor associates. *Cornus florida* (flowering dogwood) is a characteristic understory tree in portions of the range. The shrub layer is characterized by *Viburnum acerifolium* (mapleleaf viburnum), with other frequent associates including *Hamamelis virginiana* (American witchhazel), *Vaccinium corymbosum* (highbush blueberry), *Corylus cornuta* (beaked hazelnut), and *Corylus americana* (American hazelnut). A dwarf-shrub layer may be common, but is generally not abundant, and is characterized by *Vaccinium pallidum* (Blue Ridge blueberry) and *Gaylussacia baccata* (black huckleberry), with *Vaccinium angustifolium* (lowbush blueberry) occurring more frequently to the north. The herbaceous layer is characterized by *Carex pensylvanica* (Pennsylvania sedge), *Carex rosea* (rosy sedge), *Maianthemum racemosum* (feathery false lily of the valley), *Aralia nudicaulis* (wild sarsaparilla), *Hieracium venosum* (rattlesnakeweed), *Solidago bicolor* (white goldenrod), *Desmodium glutinosum* (pointedleaf ticktrefoil), *Desmodium paniculatum* (panicledleaf ticktrefoil), *Melampyrum lineare* (narrowleaf cowwheat), *Chimaphila maculata* (striped prince's pine), *Eurybia divaricata* (white wood aster), *Danthonia spicata* (poverty oatgrass), *Aureolaria* (false foxglove) spp., *Pteridium aquilinum* (western brackenfern), *Dennstaedtia punctilobula* (eastern hayscented fern), and *Helianthemum canadense* (longbranch frostweed).

Environmental Description: This forest type occurs on well-drained loamy sand of midslopes and other dry-mesic sites.

Vegetation Description: This vegetation is ecologically transitional between dry-rich oak-hickory forests of relatively high diversity and dry, acidic oak-species-poor forests. *Quercus rubra* (northern red oak), *Quercus alba* (white oak), and *Quercus velutina* (black oak) are prominent in the canopy. Typical hickory species include *Carya glabra* (pignut hickory), *Carya ovata* (shagbark hickory),

Carya alba (mockernut hickory), and *Carya ovalis* (red hickory). Other canopy associates may include *Acer rubrum* (red maple), *Quercus prinus* (chestnut oak), *Sassafras albidum* (sassafras), and *Amelanchier arborea* (common serviceberry). *Pinus strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock), and *Betula lenta* (sweet birch) may also occur as minor associates. *Cornus florida* (flowering dogwood) is a characteristic understory tree in portions of the range. The shrub layer is typically rather sparse and characterized by *Viburnum acerifolium* (mapleleaf viburnum), with other frequent associates including *Hamamelis virginiana* (American witchhazel), *Vaccinium corymbosum* (highbush blueberry), *Kalmia latifolia* (mountain laurel), *Corylus cornuta* (beaked hazelnut), and *Corylus americana* (American hazelnut). A dwarf-shrub layer may be common but generally not abundant, characterized by *Vaccinium pallidum* (Blue Ridge blueberry) and *Gaylussacia baccata* (black huckleberry), with *Vaccinium angustifolium* (lowbush blueberry) occurring more frequently to the north. The herbaceous layer is characterized by *Carex pensylvanica* (Pennsylvania sedge), *Maianthemum racemosum* (feathery false lily of the valley), *Dryopteris marginalis* (marginal woodfern), *Aralia nudicaulis* (wild sarsaparilla), *Hieracium venosum* (rattlesnakeweed), *Solidago bicolor* (white goldenrod), *Desmodium glutinosum* (pointedleaf ticktrefoil), *Desmodium paniculatum* (panicledleaf ticktrefoil), *Melampyrum lineare* (narrowleaf cowwheat), *Chimaphila maculata* (striped prince's pine), *Eurybia divaricata* (white wood aster), *Danthonia spicata* (poverty oatgrass), *Deschampsia flexuosa* (wavy hairgrass), *Dennstaedtia punctilobula* (eastern hayscented fern), *Aureolaria* (false foxglove) spp., *Pteridium aquilinum* (western brackenfern), *Dennstaedtia punctilobula* (eastern hayscented fern), and *Helianthemum canadense* (longbranch frostweed). The invasive species *Microstegium vimineum* (Nepalese browntop) and *Berberis thunbergii* (Japanese barberry) may also be present in this forest type.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus alba* (white oak), *Quercus prinus* (chestnut oak), *Quercus rubra* (northern red oak), *Quercus velutina* (black oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Cornus florida* (flowering dogwood)
Short shrub/sapling	Broad-leaved decid. shrub	*Gaylussacia baccata* (black huckleberry)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)

Characteristic Species: *Aralia nudicaulis* (wild sarsaparilla), *Carex pensylvanica* (Pennsylvania sedge), *Carya alba* (mockernut hickory), *Carya glabra* (pignut hickory), *Carya ovalis* (red hickory), *Cornus florida* (flowering dogwood), *Gaylussacia baccata* (black huckleberry), *Maianthemum racemosum* (feathery false lily of the valley), *Quercus prinus* (chestnut oak), *Vaccinium pallidum* (Blue Ridge blueberry), *Viburnum acerifolium* (mapleleaf viburnum)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association occurs from Maine to Maryland.

States/Provinces: CT, DE:S3?, MA, MD, ME, NH, NJ:S4S5, NY, PA, RI, VT

Federal Lands: NPS (Boston Harbor Islands, Cape Cod, Delaware Water Gap, Fort Necessity, Gettysburg, Minute Man, Morristown, Sagamore Hill, Saratoga, Upper Delaware, Weir Farm); USFWS (Assabet River, Great Meadows)

CONSERVATION STATUS

Rank: G4G5 (24-Jan-2005)

Reasons: This type is not naturally rare and has a wide geographic distribution. Mature stands, however, are uncommon and most stands are subject to logging disturbances or even complete destruction if located in rapidly developing suburban areas.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Acer saccharum - Betula alleghaniensis - Quercus rubra / Viburnum acerifolium Forest (CEGL006943)

Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia Forest (CEGL006293)--can intergrade with this type in New England but is characterized by *Fagus grandifolia* (more or less absent in CEGL006336), a greater amount of *Pinus strobus* in the canopy (usually >20%), and little or no *Carya*.

Quercus alba - Quercus rubra - Carya (alba, ovata) / Cornus florida Acid Forest (CEGL002067)--also contains *Actaea racemosa* and can occur on cherty limestone, and *Quercus velutina* is not characteristic.

Quercus alba - Quercus rubra - Carya alba / Cornus florida / Vaccinium stamineum / Desmodium nudiflorum Piedmont Forest (CEGL008475)--southern analogue of CEGL006336; is more diverse and occupies soils with slightly higher base status. *Quercus velutina* is not as characteristic of this type. A number of southern herbs such as *Aristolochia serpentaria* are not found in CEGL006336; northern species such as *Corylus cornuta*, *Vaccinium angustifolium*, and *Aralia nudicaulis* are not found in CEGL008475.

Quercus coccinea - Quercus velutina / Sassafras albidum / Vaccinium pallidum Forest (CEGL006375)--lacks *Viburnum acerifolium* and *Cornus florida* and in general is less diverse and occurring on relatively more nutrient-poor soils.

Quercus prinus - Quercus (rubra, velutina) / Vaccinium angustifolium Forest (CEGL006282)

Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum Forest (CEGL006301)

Quercus velutina - Quercus alba - Carya (glabra, ovata) Forest (CEGL002076)--also contains *Quercus ellipsoidalis* or *Quercus macrocarpa* and is of shorter stature and more open canopy.

Quercus velutina / Carex pensylvanica Forest (CEGL002078)--is drier and more infertile, and lacks *Viburnum acerifolium, Hamamelis virginiana* and other shrubs.

Related Concepts:

Quercus (alba, rubra, velutina) / Cornus florida - Viburnum acerifolium Forest (Bartgis 1986) =

Quercus alba - Quercus coccinea - Carya glabra / Cornus florida / Viburnum acerifolium Forest (VDNH 2003) =

Mesic Coastal Plain mixed oak forest (Breden 1989) ?

SNE mesic central hardwood forest on acidic till (Rawinski 1984) ?

SOURCES

Description Authors: S.L. Neid and L.A. Sneddon, mod. S.C. Gawler

References: Bartgis 1986, Berdine 1998, Breden 1989, Breden et al. 2001, Clancy 1996, Damman 1977, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Fike 1999, Fleming et al. 2001, Fleming pers. comm., Gawler 2002, Harrison 2004, Hunt 1997a, MENHP 1991, McCoy and Fleming 2000, Metzler and Barrett 2001, NRCS 2004, Patterson pers. comm., Rawinski 1984, Soil Conservation Service 1987, Sperduto 1997b, Sperduto and Nichols 2004, Swain and Kearsley 2001, VDNH 2003



Figure F-4. Northeastern Dry Oak-Hickory Forest in the Saratoga Battlefield Unit (AA point SARA.109, NYNHP 205). 7/18/2006. NAD 1983 / UTM easting 611699, northing 4759948.

Local Name: Upland/Wetland Transitional Forest (CEGL006000)

SYNONYMS

USNVC English Name: Northern Red Oak - Yellow Birch / Cinnamon Fern Forest

USNVC Scientific Name: ***Quercus rubra - Betula alleghaniensis / Osmunda cinnamomea* Forest**

USNVC Identifier: CEGL006000

LOCAL INFORMATION

Environmental Description: This association occurs on high, level ground between 64 and 70 m (210-230 feet) in elevation at Saratoga. The soil is moist, very deep, moderately well-drained loamy fine sand in the Oakville series (NRCS 2004), and the underlying bedrock is sandstone and shale in the Canajoharie Formation. The forest is transitional between wetlands, including Eastern Woodland Vernal Pool (CEGL006453), Southern New England Red Maple Seepage Swamp (CEGL006406), Red Maple - Lake Sedge Wooded Marsh (CEGL006105), and upland communities such as White Pine - Oak Forest (CEGL006293), White Pine Successional Forest (CEGL007944), Northeastern Dry Oak - Hickory Forest (CEGL006336), and Northeastern Oak - Red Maple Successional Forest (CEGL006506).

Vegetation Description: The tree canopy of this association is dominated by *Acer rubrum* (red maple) with *Quercus rubra* (northern red oak), *Betula lenta* (sweet birch), *Fraxinus americana* (white ash), *Populus grandidentata* (bigtooth aspen), and *Pinus strobus* (eastern white pine) as associates. Canopy species reach 25 m tall and have 70-75% cover. The subcanopy, which reaches 10-15 m in height, is more open, with 25% cover. In addition to canopy species, *Betula papyrifera* (paper birch) occurs in the subcanopy layer. Tall shrubs are sparse, with less than 10% cover, and consist of saplings of *Ulmus americana* (American elm), *Fraxinus americana* (white ash), and *Carya ovata* (shagbark hickory). Short shrubs are more abundant, with 20% cover, and contain *Rubus flagellaris* (northern dewberry), *Vaccinium pallidum* (Blue Ridge blueberry), and *Vaccinium angustifolium* (lowbush blueberry) as well as seedlings of the canopy species. Herbaceous cover is dense (80-85% cover) and is dominated by fern species, primarily *Osmunda cinnamomea* (cinnamon fern) and *Osmunda claytoniana* (interrupted fern) with *Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern), *Thelypteris noveboracensis* (New York fern), *Dryopteris intermedia* (intermediate woodfern), and *Osmunda regalis* (royal fern). *Maianthemum canadense* (Canada mayflower) and *Mitchella repens* (partridgeberry) are additional associates.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Carya ovata* (shagbark hickory), *Fraxinus americana* (white ash), *Ulmus americana* (American elm)

Short shrub/sapling	Broad-leaved deciduous shrub	*Betula lenta* (sweet birch), *Rubus flagellaris* (northern dewberry)
Herb (field)	Fern or fern ally	*Osmunda cinnamomea* (cinnamon fern), *Osmunda claytoniana* (interrupted fern)
Nonvascular	Moss	*Polytrichum commune* (polytrichum moss)

Characteristic Species: *Acer rubrum* (red maple), *Maianthemum canadense* (Canada mayflower), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Osmunda claytoniana* (interrupted fern), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4S5*	B	1	Red maple-hardwood swamp	Edinger et al. 2002

Local Range: This association occurs in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.142

Accuracy Assessment Observations: SARA.113 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Central Oak-Hardwood and Pine Forest (M012)
Group	Northeastern and North-Central Oak-Hickory Forest Group (G158)
Alliance*	*Quercus rubra - (Acer saccharum)* Forest Alliance (A.251)
Alliance (English name)*	Northern Red Oak - (Sugar Maple) Forest Alliance
Association	*Quercus rubra - Betula alleghaniensis / Osmunda cinnamomea* Forest
Association (English name)	Northern Red Oak - Yellow Birch / Cinnamon Fern Forest
Ecological System(s)	Northern Atlantic Coastal Plain Hardwood Forest (CES203.475)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This lower slope, wetland transitional forest of southern New England to New Jersey generally occurs immediately upslope from seasonally flooded acidic swamps or small drainages. It occurs on somewhat poorly drained mineral soils, with a soil moisture regime of moist to somewhat wet. The tree canopy is nearly closed, with tree height reflecting moisture availability. Dominant species include *Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), *Quercus rubra* (northern red oak), and *Quercus velutina* (black oak). Occasionally *Quercus alba* (white oak),

Quercus palustris (pin oak), *Fagus grandifolia* (American beech), and *Tsuga canadensis* (eastern hemlock) may occur. The shrub layer includes *Hamamelis virginiana* (American witchhazel), *Vaccinium corymbosum* (highbush blueberry), *Clethra alnifolia* (coastal sweetpepperbush), *Kalmia latifolia* (mountain laurel), and *Lindera benzoin* (northern spicebush). The herbaceous layer is nearly continuous and dominated by *Osmunda cinnamomea* (cinnamon fern), *Thelypteris noveboracensis* (New York fern), *Arisaema triphyllum* (Jack in the pulpit), and *Uvularia sessilifolia* (sessileleaf bellwort).

Environmental Description: This vegetation occurs on lower slopes, generally adjacent to wetlands. Mineral soils are somewhat poorly drained and moist to somewhat wet sandy loams. The substrate is often rocky.

Vegetation Description: The tree canopy is nearly closed, with tree height reflecting moisture availability. Dominant species include *Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), *Quercus rubra* (northern red oak), and *Quercus velutina* (black oak). Occasionally *Quercus alba* (white oak), *Quercus palustris* (pin oak), *Fagus grandifolia* (American beech), and *Tsuga canadensis* (eastern hemlock) may occur. *Liriodendron tulipifera* (tuliptree) is a common associate in the southern portion of the range. The shrub layer includes *Hamamelis virginiana* (American witchhazel), *Vaccinium corymbosum* (highbush blueberry), *Clethra alnifolia* (coastal sweetpepperbush), *Kalmia latifolia* (mountain laurel), and *Lindera benzoin* (northern spicebush). The herbaceous layer is nearly continuous and dominated by *Osmunda cinnamomea* (cinnamon fern), *Thelypteris noveboracensis* (New York fern), *Arisaema triphyllum* (Jack in the pulpit), and *Uvularia sessilifolia* (sessileleaf bellwort). *Impatiens capensis* (jewelweed), *Veratrum viride* (green false hellebore), and *Symplocarpus foetidus* (skunk cabbage) may also occur where this vegetation grades into a wetland forest.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Betula alleghaniensis* (yellow birch), *Quercus velutina* (black oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Clethra alnifolia* (coastal sweetpepperbush), *Hamamelis virginiana* (American witchhazel), *Lindera benzoin* (northern spicebush), *Vaccinium corymbosum* (highbush blueberry)
Short shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia* (mountain laurel)
Herb (field)	Forb	*Arisaema triphyllum* (Jack in the pulpit), *Uvularia sessilifolia* (sessileleaf bellwort)

Herb (field)	Fern or fern ally	*Osmunda cinnamomea* (cinnamon fern), *Thelypteris noveboracensis* (New York fern)

Characteristic Species: *Arisaema triphyllum* (Jack in the pulpit), *Betula alleghaniensis* (yellow birch), *Osmunda cinnamomea* (cinnamon fern), *Quercus rubra* (northern red oak), *Thelypteris noveboracensis* (New York fern), *Uvularia sessilifolia* (sessileleaf bellwort)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: The association occurs in Connecticut, Massachusetts, New Hampshire, New Jersey, and Rhode Island.
States/Provinces: CT, MA, NH, NJ, NY, RI
Federal Lands: NPS (Boston Harbor Islands, Morristown, Saratoga); USFWS (Assabet River, Great Meadows, Oxbow)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 3 - Weak
Comments: The lack of surface water and drier soil conditions during the growing season (relative to adjacent, seasonally flooded wetlands) make this forest suitable for species found more frequently in uplands.
Similar Associations:
Fagus grandifolia - Betula lenta - Quercus (alba, rubra) / Carpinus caroliniana Forest (CEGL006921)
Related Concepts:
CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B
Stream thicket community (Ehrenfeld 1977) B

SOURCES

Description Authors: S.L. Neid, mod. L.A. Sneddon
References: Damman and Kershner 1977, Eastern Ecology Working Group n.d., Ehrenfeld 1977, Golet et al. 1993, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Sperduto 2000b



Figure F-5. Upland/Wetland Transitional Forest in the Saratoga Battlefield Unit (plot SARA.142, NYNHP WT08, photo no. 54). 9/25/2003. NAD 1983 / UTM easting 612083, northing 4762427.

Local Name: Black Locust Successional Forest (CEGL007279)

SYNONYMS

USNVC English Name: Black Locust Forest
USNVC Scientific Name: *Robinia pseudoacacia* Forest
USNVC Identifier: CEGL007279

LOCAL INFORMATION

Environmental Description: This successional forest occurs in one location at Saratoga on a very gentle slope and flatland between 95 and 107 m (310-350 feet) in elevation that is probably post-agricultural. Soils are shallow to very deep, poorly drained to somewhat excessively drained silt loams and channery silt loams in the Bernardston-Manlius-Nassau complex, Manlius-Nassau complex, and Sun series (NRCS 2004). Underlying bedrock is siltstone and shale in the Mt. Merino Formation. The association is bounded on the east by Northeastern Old Field (CEGL006107) and on the west by White Pine Plantation (CEGL007178) and a paved road.

Vegetation Description: This somewhat depauperate, weedy association is characterized by strong dominance of *Robinia pseudoacacia* (black locust) with associated early-successional species, including *Prunus serotina* (black cherry) and *Fraxinus americana* (white ash). The forest is young, with canopy trees reaching 20 m in height and covering 75% of the area. Subcanopy trees (10 m tall with 65% cover) are *Rhamnus cathartica* (common buckthorn) and *Prunus serotina* (black cherry). *Rhamnus cathartica* (common buckthorn) is dominant in the tall-shrub layer, with nearly 30% cover. Short shrubs are sparse (10% cover) and consist of *Lonicera tatarica* (Tatarian honeysuckle), *Rhamnus cathartica* (common buckthorn), and *Rubus allegheniensis* (Allegheny blackberry). The invasive, exotic *Alliaria petiolata* (garlic mustard) is the most abundant herb and has nearly 60% cover in parts. *Carex hirsutella* (fuzzy wuzzy sedge) is also present.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Robinia pseudoacacia* (black locust)
Tree subcanopy	Broad-leaved deciduous tree	*Rhamnus cathartica* (common buckthorn)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Short shrub/sapling	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard)

Characteristic Species: *Alliaria petiolata* (garlic mustard), *Lonicera tatarica* (Tatarian honeysuckle), *Prunus serotina* (black cherry), *Rhamnus cathartica* (common buckthorn), *Robinia pseudoacacia* (black locust)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Successional southern hardwoods	Edinger et al. 2002

Local Range: This association occurs in the Battlefield Unit of Saratoga National Historical Park.
Classification Comments: This association was used exclusively to classify successional forests dominated by *Robinia pseudoacacia* (black locust).
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.27
Accuracy Assessment Observations: None
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Alliance*	*Robinia pseudoacacia* Forest Alliance (A.256)
Alliance (English name)*	Black Locust Forest Alliance
Association	*Robinia pseudoacacia* Forest
Association (English name)	Black Locust Forest
Ecological System(s)	Southern Interior Low Plateau Dry-Mesic Oak Forest (CES202.898)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This black locust semi-natural forest is found locally throughout the eastern United States. Stands often establish on old fields abandoned after agricultural cropping or pasturing or around old homesites. In some areas it occurs on post-agricultural floodplain terraces. This vegetation has also become established following the planting of *Robinia pseudoacacia* (black locust) to stabilize and enrich nutrient-poor soils that are subject to erosion. The vegetation is dominated by *Robinia pseudoacacia* (black locust). Associated woody species vary from site to site and include *Prunus serotina* (black cherry), *Juniperus virginiana* (eastern redcedar), *Ulmus americana* (American elm), *Ulmus rubra* (slippery elm), and in some areas *Acer platanoides* (Norway maple) or *Ailanthus altissima* (tree of heaven). Understory vegetation is highly variable depending on site history and often includes *Toxicodendron radicans* (eastern poison ivy). The invasive non-native *Rosa multiflora* (multiflora rose) may be present as a shrub. Non-native species such as *Alliaria petiolata* (garlic mustard), *Chelidonium majus* (celandine), *Glechoma hederacea* (ground ivy), and *Convallaria majalis* (European lily of the valley) can characterize the herb layer.
Environmental Description: This type often establishes on old fields abandoned after agricultural cropping or pasturing or around old home sites. This vegetation has also become established following the planting of *Robinia pseudoacacia* (black locust) to stabilize and enrich nutrient-poor

soils that are subject to erosion (Rabie 2000). Soils are variable and may be highly acidic, especially where established on old mine sites.

Vegetation Description: The vegetation is dominated by *Robinia pseudoacacia* (black locust) forming a partial to nearly complete canopy. Associated woody species vary from site to site and include *Prunus serotina* (black cherry), *Juniperus virginiana* (eastern redcedar), *Ulmus americana* (American elm), *Ulmus rubra* (slippery elm), *Acer rubrum* (red maple), *Nyssa sylvatica* (blackgum), and in some areas *Acer platanoides* (Norway maple) or *Ailanthus altissima* (tree of heaven). *Cornus florida* (flowering dogwood) may be present in the subcanopy. Understory vegetation is highly variable depending on site history and often includes *Toxicodendron radicans* (eastern poison ivy). The invasive species *Rosa multiflora* (multiflora rose) and *Elaeagnus umbellata* (autumn olive) are typically the most common shrubs. Non-native species such as *Alliaria petiolata* (garlic mustard), *Chelidonium majus* (celandine), *Glechoma hederacea* (ground ivy), *Dactylis glomerata* (orchardgrass), *Daucus carota* (Queen Anne's lace), and *Convallaria majalis* (European lily of the valley) can characterize the herb layer, which may have a native component as well, for example with *Ageratina altissima* (white snakeroot), *Dichanthelium clandestinum* (deertongue), *Parthenocissus quinquefolia* (Virginia creeper), *Pilea pumila* (Canadian clearweed), *Solidago canadensis* (Canada goldenrod), and *Solidago rugosa* (wrinkleleaf goldenrod).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Robinia pseudoacacia* (black locust)

Characteristic Species: *Acer rubrum* (red maple), *Robinia pseudoacacia* (black locust), *Rosa multiflora* (multiflora rose)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This black locust semi-natural forest is found locally throughout the eastern United States.

States/Provinces: AR, DE, IA, KY, MA, MS, NC, NJ, NY, OK, PA, TN, VA, VT, WV

Federal Lands: DOD (Camp Dawson); NPS (Blue Ridge Parkway, Buffalo River?, Cape Cod, George Washington Birthplace, Marsh-Billings-Rockefeller, Minute Man, Morristown, New River Gorge, Saratoga, Shenandoah, Vicksburg); USFS (George Washington, Jefferson, Nantahala, Ouachita, Ouachita (Mountains), Ozark, Pisgah)

CONSERVATION STATUS

Rank: GNA (ruderal) (24-Oct-2002)

Reasons: Although *Robinia pseudoacacia* (black locust) is a native species found in the Central Appalachians and Ozark Mountains, it does not typically become a dominant species in these natural habitats (Elias 1980). It is now widespread in the eastern U.S. in disturbed habitats. This forest represents early-successional vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus americana Forest (CEGL006599)--can have *Robinia* as an important canopy component but is not dominated by it as is this type.

Prunus serotina - Sassafras albidum - (Fraxinus americana) / Juniperus virginiana Forest (CEGL004133)

Robinia pseudoacacia - Celtis occidentalis - (Fraxinus americana, Liriodendron tulipifera) Forest (CEGL007281)

Related Concepts:

Juglans nigra - Robinia pseudoacacia / Lonicera japonica / Verbesina alternifolia Association (Rawinski et al. 1996) ?

Successional black locust disturbed forests (CAP pers. comm. 1998) ?

SOURCES

Description Authors: D. Faber-Langendoen, mod. S.C. Gawler and L.A. Sneddon

References: Baalman 1965, CAP pers. comm. 1998, Ehrenfeld 1977, Elias 1980, Fleming and Coulling 2001, Gaertner 1955, Hoagland 2000, INAI unpubl. data, McDonald 1938, NRCS 2004, Rabie 2000, Rawinski et al. 1996, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst et al. 2007



Figure F-6. Black Locust Successional Forest in the Saratoga Battlefield Unit (plot SARA.27, NYNHP F1, photo no. 29). 7/3/2003. NAD 1983 / UTM easting 610265, northing 4762341.

Local Name: Early-Successional Woodland/Forest (CEGL006303)

SYNONYMS

USNVC English Name:	**(Quaking Aspen, Bigtooth Aspen) - (Gray Birch, Paper Birch) Woodland**
USNVC Scientific Name:	***Populus (tremuloides, grandidentata) - Betula (populifolia, papyrifera)* Woodland**
USNVC Identifier:	**CEGL006303**

LOCAL INFORMATION

Environmental Description: This successional deciduous forest occurs in varied topographic settings, from moderately steep to flat at elevations that range from 27 to 152 m (90-500 feet). At Saratoga, it most frequently develops on very deep, moderately well-drained silt loam. However, it occurs on soils ranging from shallow to very deep and very poorly drained to somewhat excessively drained and composed of silt loam, channery silt loam, gravelly loamy sand, loamy fine sand, and mucky silty clay loam in the Bernardston, Bernardston-Manlius-Nassau complex, Hudson, Fluvaquents, Allis, Limerick-Saco complex, Madalin, Manlius-Nassau complex, Nassau-Rock outcrop complex, Oakville, Pittstown, Rhinebeck, Sun, Teel, and Tioga series (NRCS 2004). Underlying bedrock is shale, sandstone, and siltstone in the Austin Glen, Mt. Merino, and Canajoharie formations. Common surrounding and adjacent communities are White Pine - Oak Forest (CEGL006293), Northern Red Oak - Northern Hardwood Forest (CEGL006173), White Pine Successional Forest (CEGL007944), Northeastern Successional Shrubland (CEGL006451), Northeastern Old Field (CEGL006107), Little Bluestem Old Field (CEGL006333), Southern New England Red Maple Seepage Swamp (CEGL006406), Eastern Cattail Marsh (CEGL006153), Reed Canarygrass Eastern Marsh (CEGL006044), cropland/field crops, and various mowed roadsides, lawns, and pathways. Small inclusions of Skunk Cabbage - Jewelweed Seep (CEGL006567) can be found within the forest, depending on environmental setting.

Vegetation Description: This community occurs as closed-canopy forest or open woodland; in a few very exposed areas, it grades to shrubland. Understory shrub cover varies from sparse to well-developed depending primarily on canopy closure. Herbs are typically sparse but may be locally dense. Bryoids are typically minor. The tree canopy is a heterogeneous mixture of light-requiring, wind-dispersed trees with site-specific variation that includes species representative of the pre-disturbance forest. *Populus tremuloides* (quaking aspen) and *Populus grandidentata* (bigtooth aspen) are codominant with lesser amounts of *Quercus rubra* (northern red oak), *Ulmus americana* (American elm), *Acer rubrum* (red maple), *Quercus coccinea* (scarlet oak), *Betula populifolia* (gray birch), *Prunus serotina* (black cherry), *Carya ovata* (shagbark hickory), *Quercus bicolor* (swamp white oak), *Acer saccharum* (sugar maple), *Tilia americana* (American basswood), *Fraxinus pennsylvanica* (green ash), *Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam), *Pinus strobus* (eastern white pine), *Quercus alba* (white oak), *Betula lenta* (sweet birch), and *Fagus grandifolia* (American beech). Many of the same species are present in the subcanopy layer, with

Carya glabra (pignut hickory), *Amelanchier arborea* (common serviceberry), *Carpinus caroliniana* (American hornbeam), and *Betula papyrifera* (paper birch). The canopy is nearly 25 m tall with just over 65% cover, and the subcanopy is about 15 m tall with 35% cover. Composition of the tall- and short-shrub layers is similarly variable by site depending on pre-disturbance constituents and land-use history. Common tall shrubs (3 m tall with 25% cover) are *Rhamnus cathartica* (common buckthorn), *Viburnum lentago* (nannyberry), *Hamamelis virginiana* (American witchhazel), *Lonicera tatarica* (Tatarian honeysuckle), *Cornus amomum* (silky dogwood), *Corylus cornuta* (beaked hazelnut), *Viburnum dentatum* (southern arrowwood), *Corylus americana* (American hazelnut), *Betula alleghaniensis* (yellow birch), and *Viburnum nudum var. cassinoides* (withe-rod), as well as the canopy and subcanopy species listed above. The short-shrub layer (1 m tall with <30% cover) contains many of these same species along with *Rubus allegheniensis* (Allegheny blackberry), *Viburnum acerifolium* (mapleleaf viburnum), *Rubus occidentalis* (black raspberry), *Rubus flagellaris* (northern dewberry), *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium angustifolium* (lowbush blueberry), *Cornus racemosa* (gray dogwood), and *Rosa multiflora* (multiflora rose). *Parthenocissus quinquefolia* (Virginia creeper) is a common vine; associates are *Vitis riparia* (riverbank grape) and *Toxicodendron radicans* (eastern poison ivy). The herbaceous layer is somewhat sparse with 35% cover. Composition varies quite a bit from one site to the next, but usually many different species are present, each with low abundance. Common herbs are *Onoclea sensibilis* (sensitive fern), *Pilea pumila* (Canadian clearweed), *Alliaria petiolata* (garlic mustard), *Amphicarpaea bracteata* (American hogpeanut), *Solidago gigantea* (giant goldenrod), *Polystichum acrostichoides* (Christmas fern), *Osmunda claytoniana* (interrupted fern), *Solidago rugosa* (wrinkleleaf goldenrod), *Ageratina altissima var. altissima* (white snakeroot), *Poa compressa* (Canada bluegrass), *Potentilla simplex* (common cinquefoil), *Pteridium aquilinum* (western brackenfern), *Symphyotrichum lateriflorum* (calico aster), *Leersia virginica* (whitegrass), *Carex pensylvanica* (Pennsylvania sedge), *Impatiens capensis* (jewelweed), *Polygonum virginianum* (jumpseed), *Equisetum arvense* (field horsetail), *Galium mollugo* (false baby's breath), *Athyrium filix-femina* (common ladyfern), *Fragaria virginiana* (Virginia strawberry), *Arisaema triphyllum* (Jack in the pulpit), *Adiantum pedatum* (northern maidenhair), *Eurybia divaricata* (white wood aster), *Maianthemum racemosum* (feathery false lily of the valley), *Potentilla canadensis* (dwarf cinquefoil), *Scirpus cyperinus* (woolgrass), and many others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Populus tremuloides* (quaking aspen)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Betula lenta* (sweet birch), *Ulmus americana* (American elm)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hamamelis virginiana* (American witchhazel), *Rhamnus cathartica*

		(common buckthorn), *Viburnum lentago* (nannyberry)
Short shrub/sapling	Broad-leaved deciduous shrub	*Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Rubus allegheniensis* (Allegheny blackberry), *Viburnum acerifolium* (mapleleaf viburnum)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard), *Pilea pumila* (Canadian clearweed)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Acer rubrum* (red maple), *Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Onoclea sensibilis* (sensitive fern), *Parthenocissus quinquefolia* (Virginia creeper), *Populus grandidentata* (bigtooth aspen), *Populus tremuloides* (quaking aspen), *Rhamnus cathartica* (common buckthorn)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Successional northern hardwoods	Edinger et al. 2002

Local Range: This common, widespread community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.

Classification Comments: This association is used to classify successional forests dominated by *Populus* (cottonwood) spp. and/or *Betula* (birch) spp.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.14, SARA.25, SARA.30, SARA.141

Accuracy Assessment Observations: SARA.58 (AA), SARA.64 (AA), SARA.99 (AA), SARA.107 (AA), SARA.108 (AA), SARA.131 (AA), SARA.219 (AA), SARA.244 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Alliance*	*Populus tremuloides* Woodland Alliance (A.610)
Alliance (English name)*	Quaking Aspen Woodland Alliance

Association	*Populus (tremuloides, grandidentata) - Betula (populifolia, papyrifera)* Woodland
Association (English name)	(Quaking Aspen, Bigtooth Aspen) - (Gray Birch, Paper Birch) Woodland
Ecological System(s)	Boreal Aspen-Birch Forest (CES103.020) Laurentian-Acadian Northern Hardwoods Forest (CES201.564)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This is a common successional deciduous forest of the northern Appalachian Mountains, from New England, New York and adjacent Canada across to the northern Great Lakes. Small patches of this type are found on the Coastal Plain but are dominated by one or more of the following: *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen) or the non-native *Populus alba* (white poplar), and *Betula populifolia* (gray birch). It occurs in various settings, often over thin glacial till. Elevation and aspect vary. The community is broadly defined and includes vegetation developing after severe disturbance such as logging, fires, severe hurricanes, or simply heavily fragmented residential development. This community can occur as closed-canopy forest or open woodland; in a few very exposed areas, it has been seen to grade to shrubland. Understory shrub cover varies from sparse to well-developed depending primarily on canopy closure. Herbs are typically sparse but may be locally dense. Bryoids are typically minor. The tree canopy is a heterogeneous mixture of light-requiring, wind-dispersed trees usually composed of several codominant species, including *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), *Betula papyrifera* (paper birch), *Betula populifolia* (gray birch), *Populus balsamifera* (balsam poplar), *Acer rubrum* (red maple), *Prunus serotina* (black cherry), and/or *Prunus pensylvanica* (pin cherry). More minor components can include *Pinus strobus* (eastern white pine), *Picea rubens* (red spruce), *Abies balsamea* (balsam fir), *Acer saccharum* (sugar maple), *Quercus rubra* (northern red oak), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), or *Ulmus americana* (American elm) in the northern portions of the range. Scattered individuals of *Juniperus virginiana* (eastern redcedar) may occur in southern examples of this community. The shrub layer can include *Viburnum dentatum* (southern arrowwood), *Lonicera morrowii* (Morrow's honeysuckle), *Frangula alnus* (glossy buckthorn), *Rhus typhina* (staghorn sumac), *Rhus copallinum* (flameleaf sumac), *Morella pensylvanica* (northern bayberry), *Rubus* (blackberry) spp., and/or *Viburnum dentatum* (southern arrowwood), in the southern portion of the range, or *Sorbus americana* (American mountain ash), *Acer pensylvanicum* (striped maple), *Viburnum nudum var. cassinoides* (withe-rod), or *Hamamelis virginiana* (American witchhazel). *Vaccinium angustifolium* (lowbush blueberry), *Kalmia angustifolia* (sheep laurel), *Gaylussacia baccata* (black huckleberry), and *Comptonia peregrina* (sweet fern) may form a dwarf-shrub layer in the northern portion of the range. Associated herbs to the north typically include *Pteridium aquilinum* (western brackenfern), *Deschampsia flexuosa* (wavy hairgrass), *Festuca trachyphylla* (hard fescue), *Cornus canadensis* (bunchberry dogwood), *Doellingeria umbellata* (parasol whitetop), *Eurybia macrophylla* (bigleaf aster), *Danthonia spicata* (poverty oatgrass), *Carex lucorum* (Blue Ridge sedge) and related species, and *Maianthemum canadense* (Canada mayflower). Typical bryoids include *Polytrichum commune* (polytrichum moss), *Polytrichum juniperinum* (juniper polytrichum moss), *Dicranum* (dicranum moss) spp., and *Cladonia* (cup lichen) spp. Herbs in southern examples of this community are

typically old-field grasses and *Solidago* (goldenrod) spp. In the absence of major disturbance, these forests mostly succeed to northern hardwood, spruce-fir, mixed northern hardwood-spruce-fir, or red oak - northern hardwood forests in the northern portion of the range.

Environmental Description: It occurs in various settings, often over thin glacial till. Elevation and aspect vary. The community is broadly defined, and includes vegetation developing after severe disturbance such as logging, fires, severe hurricanes, or simply heavily fragmented residential development.

Vegetation Description: This community can occur as closed-canopy forest or open woodland; in a few very exposed areas, it has been seen to grade to shrubland. Understory shrub cover varies from sparse to well-developed depending primarily on canopy closure. Herbs are typically sparse, but may be locally dense. Bryoids are typically minor. The tree canopy is a heterogeneous mixture of light-requiring, wind-dispersed trees usually composed of several codominant species including *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), *Betula papyrifera* (paper birch), *Betula populifolia* (gray birch), *Populus balsamifera* (balsam poplar), *Acer rubrum* (red maple), *Prunus serotina* (black cherry), and/or *Prunus pensylvanica* (pin cherry). More minor components can include *Pinus strobus* (eastern white pine), *Picea rubens* (red spruce), *Abies balsamea* (balsam fir), *Acer saccharum* (sugar maple), *Quercus rubra* (northern red oak), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), or *Ulmus americana* (American elm). The shrub layer in the northern portion of the range includes *Sorbus americana* (American mountain ash), *Acer pensylvanicum* (striped maple), *Viburnum nudum var. cassinoides* (withe-rod), or *Hamamelis virginiana* (American witchhazel). *Vaccinium angustifolium* (lowbush blueberry), *Kalmia angustifolia* (sheep laurel), *Gaylussacia baccata* (black huckleberry), and *Comptonia peregrina* (sweet fern) may form a dwarf-shrub layer. Associated herbs to the north typically include *Pteridium aquilinum* (western brackenfern), *Deschampsia flexuosa* (wavy hairgrass), *Festuca trachyphylla* (hard fescue), *Cornus canadensis* (bunchberry dogwood), *Doellingeria umbellata* (parasol whitetop), *Eurybia macrophylla* (bigleaf aster), *Danthonia spicata* (poverty oatgrass), *Carex lucorum* (Blue Ridge sedge) and related species, and *Maianthemum canadense* (Canada mayflower). Typical bryoids include *Polytrichum commune* (polytrichum moss), *Polytrichum juniperinum* (juniper polytrichum moss), *Dicranum* (dicranum moss) spp., and *Cladonia* (cup lichen) spp. Herbs in southern examples of this community are typically old-field grasses and *Solidago* (goldenrod) spp. Small patches of this type are found on the Coastal Plain but are dominated by one or more of the following: *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), or the non-native *Populus alba* (white poplar), and *Betula populifolia* (gray birch) (usually not *Betula lenta* (sweet birch) or *Betula alleghaniensis* (yellow birch)).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Betula papyrifera* (paper birch), *Betula populifolia* (gray birch), *Populus grandidentata* (bigtooth aspen), *Populus tremuloides* (quaking aspen)

Tall shrub/sapling	Broad-leaved deciduous shrub	*Viburnum dentatum* (southern arrowwood), *Viburnum nudum* var. *cassinoides* (withe-rod)
Herb (field)	Graminoid	*Deschampsia flexuosa* (wavy hairgrass), *Festuca trachyphylla* (hard fescue)

Characteristic Species: *Betula populifolia* (gray birch), *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen)

Other Noteworthy Species:

Species	GRank	Type	Note
Dendroica pensylvanica (chestnut-sided warbler)	-	animal	
Sphyrapicus varius (yellow-bellied sapsucker)	-	animal	
Vermivora ruficapilla (nashville warbler)	-	animal	

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: Information not available.

States/Provinces: MA, ME:S5, NB, NH, NY, VT

Federal Lands: NPS (Acadia, Boston Harbor Islands, Gateway, Saratoga); USFS (Finger Lakes); USFWS (Aroostook, Assabet River, Carlton Pond?, Moosehorn, Nulhegan Basin)

CONSERVATION STATUS

Rank: G5 (20-Apr-2000)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: Information not available.

Similar Associations: Information not available.

Related Concepts:

CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B

Mesic Northern Hardwood Forest (Beech-Birch-Maple Forest) (Thompson 1996) B

SOURCES

Description Authors: S.C. Gawler, mod. E. Largay

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Gawler 2002, NRCS 2001b, NRCS 2004, Rawinski 1984, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-7. Early-Successional Woodland/Forest in the Saratoga Battlefield Unit - *Betula populifolia* (gray birch) dominant (plot SARA.14, NYNHP BS6). 7/21/2004. NAD 1983 / UTM easting 610401, northing 4759095.



Figure F-8. Early-Successional Woodland/Forest in the Saratoga Battlefield Unit - *Populus tremuloides* (quaking aspen) dominant (AA point SARA.107, NYNHP 203). 9/21/2006. NAD 1983 / UTM easting 610279, northing 4760746.

Local Name: White Pine Successional Forest (CEGL007944)

SYNONYMS

USNVC English Name: White Pine Successional Forest
USNVC Scientific Name: *Pinus strobus* Successional Forest
USNVC Identifier: CEGL007944

LOCAL INFORMATION

Environmental Description: This early-successional forest has likely developed on former agricultural land and occurs in most any environmental setting. Soils vary widely from shallow to very deep and from excessively drained to poorly drained (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. Similarly, adjacent and surrounding natural communities vary widely depending on past land use. Interestingly, a patch of Skunk Cabbage - Jewelweed Seep (CEGL006567) occurs within one polygon of this association.

Vegetation Description: The canopy layer of this successional forest is strongly dominated by *Pinus strobus* (eastern white pine) and is overtopped by an emergent tree layer containing scattered *Ulmus americana* (American elm). The emergent trees are nearly 30 m tall, the canopy species reach 20-25 m in height, and subcanopy trees are 10-15 m tall. Canopy and subcanopy associates are varied according to site conditions and land-use history; they include *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Prunus serotina* (black cherry), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm), *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), *Quercus rubra* (northern red oak), *Quercus coccinea* (scarlet oak), *Quercus alba* (white oak), *Tilia americana* (American basswood), *Salix alba* (white willow), *Ostrya virginiana* (hophornbeam), *Carpinus caroliniana* (American hornbeam), *Rhamnus cathartica* (common buckthorn), *Malus pumila* (paradise apple), *Crataegus* (hawthorn) sp. and *Carya glabra* (pignut hickory). Tall shrubs (15% cover) include many of the species listed above as well as *Lonicera tatarica* (Tatarian honeysuckle), *Cornus racemosa* (gray dogwood), *Viburnum lentago* (nannyberry), *Viburnum dentatum* (southern arrowwood), *Viburnum nudum var. cassinoides* (withe-rod), *Cornus amomum* (silky dogwood), *Cornus florida* (flowering dogwood), *Rubus occidentalis* (black raspberry), *Rubus allegheniensis* (Allegheny blackberry), *Ilex verticillata* (common winterberry), *Betula lenta* (sweet birch), and *Amelanchier arborea* (common serviceberry). Species unique to the short-shrub layer (25-30% cover) are *Rubus flagellaris* (northern dewberry) and *Rubus hispidus* (bristly dewberry). The sparse vine layer contains *Parthenocissus quinquefolia* (Virginia creeper) with lesser amounts of *Vitis riparia* (riverbank grape), *Toxicodendron radicans* (eastern poison ivy), *Vitis aestivalis* (summer grape), and *Celastrus orbiculatus* (Oriental bittersweet). The herbaceous layer, with 40% cover, contains a variable mix of old field and forest species; composition depends on site condition, history, and degree of canopy closure. The most abundant and characteristic species are *Onoclea sensibilis* (sensitive fern), *Leersia virginica* (whitegrass), *Solidago gigantea* (giant goldenrod), *Fragaria virginiana* (Virginia strawberry),

Solidago rugosa (wrinkleleaf goldenrod), *Veronica serpyllifolia* (thymeleaf speedwell), *Carex pensylvanica* (Pennsylvania sedge), *Alliaria petiolata* (garlic mustard), and *Amphicarpaea bracteata* (American hogpeanut) with lesser amounts of *Galium circaezans* (licorice bedstraw), *Potentilla simplex* (common cinquefoil), *Polygonum sagittatum* (arrowleaf tearthumb), *Galium mollugo* (false baby's breath), *Clinopodium vulgare* (wild basil), *Athyrium filix-femina* (common ladyfern), *Pilea pumila* (Canadian clearweed), *Ageratina altissima var. altissima* (white snakeroot), *Veronica officinalis* (common gypsyweed), *Oxalis stricta* (common yellow oxalis), *Euthamia graminifolia* (flat-top goldentop), *Dactylis glomerata* (orchardgrass), *Bromus inermis* (smooth brome), *Polygonum virginianum* (jumpseed), *Galium triflorum* (fragrant bedstraw), *Achillea millefolium* (common yarrow), *Symphyotrichum lateriflorum* (calico aster), *Piptatherum racemosum* (blackseed ricegrass), *Juncus tenuis* (poverty rush), *Phalaris arundinacea* (reed canarygrass), *Phleum pratense* (timothy), and many more.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Tree subcanopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Rhamnus cathartica* (common buckthorn), *Ulmus americana* (American elm)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Fragaria virginiana* (Virginia strawberry), *Solidago gigantea* (giant goldenrod), *Veronica serpyllifolia* (thymeleaf speedwell)
Herb (field)	Graminoid	*Leersia virginica* (whitegrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Acer rubrum* (red maple), *Fragaria virginiana* (Virginia strawberry), *Fraxinus americana* (white ash), *Leersia virginica* (whitegrass), *Lonicera tatarica* (Tatarian honeysuckle), *Onoclea sensibilis* (sensitive fern), *Parthenocissus quinquefolia* (Virginia creeper), *Pinus strobus* (eastern white pine), *Prunus serotina* (black cherry), *Rhamnus cathartica* (common buckthorn), *Solidago gigantea* (giant goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), *Ulmus americana* (American elm)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Successional northern hardwoods	Edinger et al. 2002

Local Range: This common, widespread community is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary. Mapping and accuracy assessment indicate that this is probably the most abundant natural or semi-natural vegetation association at SARA.

Classification Comments: This association may look similar to the Eastern White Plantation (CEGL007178). Polygons and plots with uneven-aged white pine in the canopy and subcanopy with other successional species are classified as White Pine Successional Forest (CEGL007944). Polygons and plots that contain even-aged white pine planted in obvious rows and/or had few associated successional species in all strata are classified as CEGL007178.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.26, SARA.74, SARA.111, SARA.115, SARA.125, SARA.129, SARA.135, SARA.138, SARA.149, SARA.151, SARA.155

Accuracy Assessment Observations: SARA.1 (AA), SARA.2 (AA), SARA.3 (AA), SARA.5 (AA), SARA.16 (AA), SARA.19 (AA), SARA.25 (AA), SARA.26 (AA), SARA.28 (AA), SARA.30 (AA),SARA.34 (AA), SARA.43 (AA), SARA.51 (AA), SARA.57 (AA), SARA.63 (AA), SARA.67 (AA), SARA.73 (AA), SARA.102 (AA), SARA.103 (AA), SARA.133 (AA), SARA.138 (AA), SARA.139 (AA), SARA.147 (AA), SARA.148 (AA), SARA.149 (AA), SARA.162 (AA), SARA.164 (AA), SARA.209 (AA)

Reference Observations: SARA.226, SARA.238

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Alliance*	*Pinus strobus* Forest Alliance (A.128)
Alliance (English name)*	Eastern White Pine Forest Alliance
Association	*Pinus strobus* Successional Forest
Association (English name)	White Pine Successional Forest
Ecological System(s)	Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593) Northeastern Interior Dry-Mesic Oak Forest (CES202.592)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This forest is an early-successional forest dominated by *Pinus strobus* (eastern white pine), typically with a very dense canopy and little understory. This successional forest is

commonly associated with anthropogenic disturbance and could potentially occur anywhere within the range of the *Pinus strobus* Forest Alliance (A.128). Associated woody and herbaceous species vary with geography. In the northeastern states, the tree canopy is often monotypic and even-aged, with occasional associates including *Acer rubrum* (red maple), *Juniperus virginiana* (eastern redcedar), or scattered *Quercus rubra* (northern red oak) or *Quercus velutina* (black oak). In regions where northern hardwoods are more prevalent, canopy associates include *Fraxinus americana* (white ash) and *Acer saccharum* (sugar maple). The understory is poorly developed or characterized by scattered individuals found in the canopy. The herbaceous cover is variable depending on the density of tree and shrub cover. In more open stands, typical species are those associated with old fields: *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Anthoxanthum odoratum* (sweet vernalgrass), *Poa pratensis* (Kentucky bluegrass), *Schizachyrium scoparium* (little bluestem), *Elymus repens* (quackgrass), *Bromus inermis* (smooth brome), *Agrostis gigantea* (redtop), *Euthamia graminifolia* (flat-top goldentop), *Achillea millefolium* (common yarrow), and *Daucus carota* (Queen Anne's lace). In stands that are more heavily forested, typical herbs include *Aralia nudicaulis* (wild sarsaparilla), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Mitchella repens* (partridgeberry), and *Lycopodium* (clubmoss) species. The substrate is usually covered by a thick layer of pine needle duff. In the Southern Blue Ridge, where this association was originally defined, typical canopy and subcanopy associates include *Liriodendron tulipifera* (tuliptree), *Acer rubrum* (red maple), *Pinus rigida* (pitch pine), and *Liquidambar styraciflua* (sweetgum), with *Tsuga canadensis* (eastern hemlock) often forming a dense shrub stratum. The understory is typically made up of ruderal or exotic species that favor openings or disturbance. In this ecoregion, it occurs in former old fields and on formerly cleared flats along streams. In the Daniel Boone National Forest of Kentucky, *Pinus strobus* (eastern white pine) is spreading from plantings, especially in the Red River Gorge.

Environmental Description: This wide-ranging successional forest is commonly associated with anthropogenic disturbance and could potentially occur anywhere within the range of the *Pinus strobus* Forest Alliance (A.128). It typically occurs on former agricultural lands and old fields that are no longer intensively mowed, plowed or managed, developing as *Pinus strobus* (eastern white pine) colonizes the open fields. Associated woody and herbaceous species vary with geography but are typically ruderal or exotic species that favor openings or disturbance.

Vegetation Description: The tree canopy ranges from woodland to forest closure, with 25-85% cover. It is often monotypic and even-aged *Pinus strobus* (eastern white pine), with occasional associates, including *Acer rubrum* (red maple), *Betula lenta* (sweet birch), *Juniperus virginiana* (eastern redcedar), or scattered *Quercus rubra* (northern red oak) or *Quercus velutina* (black oak). *Liriodendron tulipifera* (tuliptree) is a common minor associate in the southeastern portion of the range. In regions where northern hardwoods are more prevalent, canopy associates include *Fraxinus americana* (white ash) and *Acer saccharum* (sugar maple). The understory is poorly developed or characterized by scattered individuals found in the canopy. Shrubs are often present in the more open stands and include native species, such as *Cornus racemosa* (gray dogwood), *Rhus glabra* (smooth sumac), *Viburnum prunifolium* (blackhaw), and *Rubus* (blackberry) spp., as well as exotics, such as

Elaeagnus umbellata (autumn olive), *Rosa multiflora* (multiflora rose), *Lonicera morrowii* (Morrow's honeysuckle), and *Berberis thunbergii* (Japanese barberry). The herbaceous cover is variable depending on the density of tree and shrub cover. In more open stands, typical species are those associated with old fields: *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Anthoxanthum odoratum* (sweet vernalgrass), *Poa pratensis* (Kentucky bluegrass), *Schizachyrium scoparium* (little bluestem), *Elymus repens* (quackgrass), *Bromus inermis* (smooth brome), *Agrostis gigantea* (redtop), *Euthamia graminifolia* (flat-top goldentop), *Achillea millefolium* (common yarrow), and *Daucus carota* (Queen Anne's lace). In stands that are more heavily forested, typical herbs include *Aralia nudicaulis* (wild sarsaparilla), *Maianthemum canadense* (Canada mayflower), *Medeola virginiana* (Indian cucumber), *Trientalis borealis* (starflower), *Mitchella repens* (partridgeberry), and *Lycopodium* (clubmoss) species. The substrate is usually covered by a thick layer of pine needle duff. In the Southern Blue Ridge, where this association was originally defined, typical canopy and subcanopy associates include *Liriodendron tulipifera* (tuliptree), *Acer rubrum* (red maple), *Pinus rigida* (pitch pine), and *Liquidambar styraciflua* (sweetgum), with *Tsuga canadensis* (eastern hemlock) often forming a dense shrub stratum. In the Daniel Boone National Forest of Kentucky, *Pinus strobus* (eastern white pine) is spreading from plantings, especially in the Red River Gorge.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)

Characteristic Species: *Pinus strobus* (eastern white pine)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This weedy type may be expected to occur throughout the range of the alliance (i.e., from Michigan, northern Wisconsin, northern and eastern Minnesota, extreme northeastern Iowa, and from Maine and New Hampshire south to Georgia and Tennessee, as well as in Ontario, Canada). It has only been documented in areas where project-specific needs have required it.

States/Provinces: CT, GA, KY, MA, MD?, ME, MI, MN, NC, NH, NJ, NY, PA, RI, SC, TN, VA, VT, WI, WV

Federal Lands: NPS (Big South Fork, Blue Ridge Parkway, Carl Sandburg Home, Delaware Water Gap, Gettysburg, Great Smoky Mountains, Marsh-Billings-Rockefeller, New River Gorge, Obed, Saint-Gaudens, Saratoga); USFS (Cherokee?, Daniel Boone, George Washington, Jefferson); USFWS (Great Meadows, Moosehorn)

CONSERVATION STATUS

Rank: GNA (ruderal) (11-Feb-2001)

Reasons: This forest represents early-successional vegetation and is thus not of conservation concern and does not receive a conservation status rank.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate
Comments: This weedy type may be expected to occur throughout the range of the alliance but has only been attributed in areas where The Nature Conservancy ecoregional planning or other project-specific needs have documented its occurrence. Rangewide review should greatly expand its geographic scope.
Similar Associations:
Pinus strobus Planted Forest (CEGL007178)
Related Concepts:
Pinus strobus / (Diphasiastrum digitatum, Lycopodium obscurum) forest (Vanderhorst 2001b) =
White Pine - White Oak - Chestnut Oak Type (Schmalzer and DeSelm 1982) B
SOURCES
Description Authors: K.D. Patterson, mod. L.A. Sneddon and S.C. Gawler
References: Fleming and Coulling 2001, NRCS 2004, NatureServe Ecology - Southeastern U.S. unpubl. data, Schmalzer and DeSelm 1982, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007.



Figure F-9. White Pine Successional Forest in the Saratoga Battlefield Unit (AA point SARA.16, NYNHP 46). 7/18/2006. NAD 1983 / UTM easting 611192, northing 4762785.

Local Name: Northeastern Modified Successional Forest (CEGL006599)

SYNONYMS

USNVC English Name: Black Cherry - Tuliptree - Red Maple - White Ash Forest

USNVC Scientific Name: ***Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus americana*** **Forest**

USNVC Identifier: CEGL006599

LOCAL INFORMATION

Environmental Description: This successional forest develops in extremely variable environmental settings primarily on post-agricultural lands. At Saratoga, it occurs at elevations that range from 30 to 122 m (100-400 feet) on largely southeast-facing low to high slopes. Soils vary from shallow to very deep, very poorly drained to somewhat excessively drained mucky silty clay loam, silt loam, channery silt loam, and gravelly loamy sand in the Madalin, Bernardston, Sun, Rhinebeck, Pittstown, Manlius-Nassau complex Bernardston-Manlius-Nassau complex, Fluvaquents, and Hudson series (NRCS 2004). The underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. Communities that are most frequently adjacent to this association at Saratoga are Northeastern Old Field (CEGL006107), White Pine Successional Forest (CEGL007944), Mixed Forb Marsh (CEGL006446), Eastern Cattail Marsh (CEGL006153), and Reed Canarygrass Eastern Marsh (CEGL006044).

Vegetation Description: Early-successional woody species dominate the open canopy of this association in a widely variable mix, depending on land-use history and site conditions. Tree species include some combination of *Prunus serotina* (black cherry), *Fraxinus americana* (white ash), *Ulmus americana* (American elm), *Acer rubrum* (red maple), and *Fraxinus pennsylvanica* (green ash) with associates that include *Ailanthus altissima* (tree of heaven), *Pinus strobus* (eastern white pine), *Ostrya virginiana* (hophornbeam), *Rhamnus cathartica* (common buckthorn), *Acer saccharinum* (silver maple), *Acer platanoides* (Norway maple), *Carya ovata* (shagbark hickory), *Acer saccharum* (sugar maple), *Robinia pseudoacacia* (black locust), and *Celtis occidentalis* (common hackberry). Many of these species also occur in an open subcanopy layer. The tree canopy is 20-25 m tall with 55% cover, and the subcanopy layer reaches 10-15 m in height with 20-25% cover. The tall-shrub layer (40-45% cover) contains some saplings of these canopy and subcanopy species as well as *Lonicera tatarica* (Tatarian honeysuckle), *Viburnum dentatum* (southern arrowwood), *Cornus racemosa* (gray dogwood), *Viburnum nudum var. cassinoides* (withe-rod), *Ilex verticillata* (common winterberry), *Cornus amomum* (silky dogwood), *Viburnum lentago* (nannyberry), and *Rubus occidentalis* (black raspberry). The well-developed short-shrub layer (45-50% cover) contains many of the same species with the addition of *Rubus allegheniensis* (Allegheny blackberry), *Rosa multiflora* (multiflora rose), *Rubus flagellaris* (northern dewberry), *Rubus hispidus* (bristly dewberry), *Berberis thunbergii* (Japanese barberry), and *Viburnum acerifolium* (mapleleaf viburnum). *Parthenocissus quinquefolia* (Virginia creeper) is a somewhat common vine, and *Toxicodendron radicans* (eastern poison ivy) and *Vitis riparia* (riverbank grape) are also present.

Herbaceous species (50-55% cover) are variable and include *Onoclea sensibilis* (sensitive fern), *Pilea pumila* (Canadian clearweed), *Alliaria petiolata* (garlic mustard), *Athyrium filix-femina* (common ladyfern), *Solidago rugosa* (wrinkleleaf goldenrod), *Galium triflorum* (fragrant bedstraw), *Solidago gigantea* (giant goldenrod), *Fragaria virginiana* (Virginia strawberry), *Galium circaezans* (licorice bedstraw), *Ageratina altissima var. altissima* (white snakeroot), *Agrimonia gryposepala* (tall hairy agrimony), *Potentilla simplex* (common cinquefoil), *Symphyotrichum lateriflorum* (calico aster), *Impatiens capensis* (jewelweed), *Leersia virginica* (whitegrass), *Elymus riparius* (riverbank wildrye), *Viola cucullata* (marsh blue violet), *Poa compressa* (Canada bluegrass), *Oxalis stricta* (common yellow oxalis), *Brachyelytrum erectum* (bearded shorthusk), *Dryopteris intermedia* (intermediate woodfern), *Juncus tenuis* (poverty rush), *Phleum pratense* (timothy), *Thelypteris palustris* (eastern marsh fern), and many others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Tree canopy	Broad-leaved deciduous tree	*Fraxinus americana* (white ash), *Prunus serotina* (black cherry)
Tree subcanopy	Broad-leaved deciduous tree	*Rhamnus cathartica* (common buckthorn)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard), *Pilea pumila* (Canadian clearweed), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Fern or fern ally	*Athyrium filix-femina* (common ladyfern), *Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Alliaria petiolata* (garlic mustard), *Athyrium filix-femina* (common ladyfern), *Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Onoclea sensibilis* (sensitive fern), *Parthenocissus quinquefolia* (Virginia creeper), *Pilea pumila* (Canadian clearweed), *Prunus serotina* (black cherry), *Rhamnus cathartica* (common buckthorn), *Rubus occidentalis* (black raspberry), *Solidago rugosa* (wrinkleleaf goldenrod), *Ulmus americana* (American elm)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Successional southern hardwoods	Edinger et al. 2002

Local Range: This common, widespread community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.117, SARA.183
Accuracy Assessment Observations: SARA.8 (AA), SARA.10 (AA), SARA.52 (AA), SARA.54 (AA), SARA.56 (AA), SARA.79 (AA), SARA.98 (AA), SARA.110 (AA), SARA.119 (AA), SARA.145 (AA), SARA.171 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Alliance*	*Prunus serotina - Acer rubrum - Amelanchier canadensis - Quercus* spp. Forest Alliance (A.237)
Alliance (English name)*	Black Cherry - Red Maple - Canadian Serviceberry - Oak species Forest Alliance
Association	*Prunus serotina - Liriodendron tulipifera - Acer rubrum - Fraxinus americana - (Robinia pseudoacacia)* Forest
Association (English name)	Black Cherry - Tuliptree - Red Maple - White Ash - (Black Locust) Forest
Ecological System(s)	Semi-natural / Altered Vegetation and Conifer Plantations (CES203.074)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This early-successional woody vegetation of the northeastern United States occurs on sites that are becoming reforested after having been cleared for agriculture. Environmental setting varies, but generally sites are dry-mesic to mesic, with small seepage inclusions in some examples. Physiognomy of this vegetation is highly variable, ranging from closed forest, open forest, tall dense shrubland, to more open tall shrubland. Early-successional woody species dominate the canopy in a widely variable mix, depending on geographic location. Tree species often include some combination of *Prunus serotina* (black cherry), *Liriodendron tulipifera* (tuliptree), *Fraxinus americana* (white ash), *Robinia pseudoacacia* (black locust), and *Acer rubrum* (red maple). Other associates can include *Juglans nigra* (black walnut), *Sassafras albidum* (sassafras), *Betula populifolia* (gray birch), *Juniperus virginiana* (eastern redcedar), *Acer negundo* (box-elder), *Acer saccharinum* (silver maple), *Ailanthus altissima* (tree of heaven), *Ulmus americana* (American elm), *Quercus* (oak) spp., *Betula lenta* (sweet birch), *Amelanchier* (serviceberry) spp., *Pinus strobus*

(eastern white pine), and *Populus grandidentata* (bigtooth aspen). Other woody species may contribute to the canopy or form a tall-shrub layer, including *Lindera benzoin* (northern spicebush) and *Carpinus caroliniana* (American hornbeam). The low-shrub layer, if present, is usually characterized by the presence of *Rubus* (blackberry) spp. such as *Rubus flagellaris* (northern dewberry), *Rubus allegheniensis* (Allegheny blackberry), *Rubus phoenicolasius* (wine raspberry), or *Rubus hispidus* (bristly dewberry). This layer is often dominated by exotic species such as *Lonicera tatarica* (Tatarian honeysuckle), *Lonicera morrowii* (Morrow's honeysuckle), *Rhamnus cathartica* (common buckthorn), *Crataegus* (hawthorn) spp., *Rosa multiflora* (multiflora rose), and *Berberis thunbergii* (Japanese barberry). The herbaceous layer is variable, often containing grasses and forbs of both native and exotic origin. Common species include *Ageratina altissima var. altissima* (white snakeroot), *Polygonum persicaria* (spotted ladysthumb), *Impatiens capensis* (jewelweed), *Glechoma hederacea* (ground ivy), *Polystichum acrostichoides* (Christmas fern), *Calystegia sepium ssp. sepium* (hedge false bindweed), *Galium aparine* (stickywilly), *Oxalis stricta* (common yellow oxalis), *Polygonum virginianum* (jumpseed), *Dennstaedtia punctilobula* (eastern hayscented fern), *Arisaema triphyllum* (Jack in the pulpit), *Allium vineale* (wild garlic), and *Veronica officinalis* (common gypsyweed), among many others. The invasive species *Alliaria petiolata* (garlic mustard), *Microstegium vimineum* (Nepalese browntop), and *Polygonum caespitosum* (oriental ladysthumb) can be abundant in this disturbed forest type. Vines can be absent or abundant. In stands with high vine cover, the vegetation structure can be altered by the weight of the vines pulling down trees and shrubs. Common vines include *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy), *Vitis labrusca* (fox grape), and the invasive vines *Celastrus orbiculatus* (Asian bittersweet) and *Lonicera japonica* (Japanese honeysuckle). These forests are often young and resulted from the colonization of old agricultural fields by woody species. Recent disturbance or abundant invasive species give these forest stands a weedy character. It is unlikely that these stands will succeed to a natural plant community dominated by native species.

Environmental Description: This vegetation occurs on sites that have been cleared for agriculture or otherwise heavily modified in the past. Generally sites are dry-mesic and may have small seepage inclusions in some examples. Occasionally this type may occur in formerly agricultural bottomlands, in which case the soils may be temporarily flooded or saturated.

Vegetation Description: Early-successional woody species dominate the canopy in a widely variable mix, depending on geographic location. Tree species often include some combination of *Prunus serotina* (black cherry), *Liriodendron tulipifera* (tuliptree), *Fraxinus americana* (white ash), *Robinia pseudoacacia* (black locust), and *Acer rubrum* (red maple). Other associates can include *Juglans nigra* (black walnut), *Sassafras albidum* (sassafras), *Betula populifolia* (gray birch), *Juniperus virginiana* (eastern redcedar), *Acer negundo* (box-elder), *Acer saccharinum* (silver maple), *Ailanthus altissima* (tree of heaven), *Ulmus americana* (American elm), *Quercus* (oak) spp., *Betula lenta* (sweet birch), *Amelanchier* (serviceberry) spp., *Pinus strobus* (eastern white pine), and *Populus grandidentata* (bigtooth aspen). Other woody species may contribute to the canopy or form a tall-shrub layer, including *Lindera benzoin* (northern spicebush) and *Carpinus caroliniana* (American hornbeam). The low-shrub layer, if present, is usually characterized by the presence of *Rubus*

(blackberry) spp. such as *Rubus flagellaris* (northern dewberry), *Rubus allegheniensis* (Allegheny blackberry), *Rubus phoenicolasius* (wine raspberry), or *Rubus hispidus* (bristly dewberry). This layer is often dominated by exotic species such as *Lonicera tatarica* (Tatarian honeysuckle), *Lonicera morrowii* (Morrow's honeysuckle), *Rhamnus cathartica* (common buckthorn), *Crataegus* (hawthorn) spp., *Rosa multiflora* (multiflora rose), and *Berberis thunbergii* (Japanese barberry). The herbaceous layer is variable, often containing grasses and forbs of both native and exotic origin. Common species include *Ageratina altissima var. altissima* (white snakeroot), *Polygonum persicaria* (spotted ladysthumb), *Impatiens capensis* (jewelweed), *Glechoma hederacea* (ground ivy), *Polystichum acrostichoides* (Christmas fern), *Calystegia sepium ssp. sepium* (hedge false bindweed), *Galium aparine* (stickywilly), *Oxalis stricta* (common yellow oxalis), *Polygonum virginianum* (jumpseed), *Dennstaedtia punctilobula* (eastern hayscented fern), *Arisaema triphyllum* (Jack in the pulpit), *Allium vineale* (wild garlic), and *Veronica officinalis* (common gypsyweed), among many others. The invasive species *Alliaria petiolata* (garlic mustard), *Microstegium vimineum* (Nepalese browntop), and *Polygonum caespitosum* (oriental ladysthumb) can be abundant in this disturbed forest type. Vines can be absent or abundant. In stands with high vine cover, the vegetation structure can be altered by the weight of the vines pulling down trees and shrubs. Common vines include *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy), *Vitis labrusca* (fox grape), and the invasive vines *Celastrus orbiculatus* (Asian bittersweet) and *Lonicera japonica* (Japanese honeysuckle).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Fraxinus americana* (white ash), *Liriodendron tulipifera* (tuliptree), *Prunus serotina* (black cherry), *Robinia pseudoacacia* (black locust)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tall shrub/sapling	Broad-leaved deciduous tree	*Carpinus caroliniana* (American hornbeam)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Lindera benzoin* (northern spicebush), *Rosa multiflora* (multiflora rose)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard), *Polygonum persicaria* (spotted ladysthumb)
Herb (field)	Graminoid	*Microstegium vimineum* (Nepalese browntop)

Characteristic Species: *Acer rubrum* (red maple), *Alliaria petiolata* (garlic mustard), *Berberis thunbergii* (Japanese barberry), *Elaeagnus umbellata* (autumn olive), *Fraxinus americana* (white ash), *Juglans nigra* (black walnut), *Liriodendron tulipifera* (tuliptree), *Microstegium vimineum* (Nepalese browntop), *Polygonum persicaria* (spotted ladysthumb), *Prunus serotina* (black cherry),

Robinia pseudoacacia (black locust), *Rosa multiflora* (multiflora rose), *Rubus allegheniensis* (Allegheny blackberry)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This vegetation is currently described from Pennsylvania, New York, and New Jersey but is of broader distribution in the northeastern U.S.

States/Provinces: CT, DE, MA, NJ, NY, PA

Federal Lands: NPS (Allegheny Portage Railroad, Boston Harbor Islands, Delaware Water Gap, Fort Necessity, Friendship Hill, Gateway, Gettysburg, Johnstown Flood, Morristown, Sagamore Hill, Saratoga, Saugus Iron Works, Upper Delaware, Valley Forge, Weir Farm); USFWS (Erie, Great Meadows?, Prime Hook)

CONSERVATION STATUS

Rank: GNA (ruderal) (29-Nov-2004)

Reasons: This vegetation is modified by human activity and not of conservation concern.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This vegetation is broadly defined and varies widely in composition across its range, presenting a classification challenge at the alliance level.

Similar Associations:

Juglans nigra / Verbesina alternifolia Forest (CEGL007879)

Liriodendron tulipifera - Quercus spp. Forest (CEGL007221)--is more strongly dominated by *Liriodendron* and is generally in a later successional state as evidenced by taller trees and more closed canopy.

Prunus serotina - Sassafras albidum - (Fraxinus americana) / Juniperus virginiana Forest (CEGL004133)

Robinia pseudoacacia Forest (CEGL007279)

Related Concepts: Information not available.

SOURCES

Description Authors: L.A. Sneddon, mod. S.C. Gawler and E. Largay

References: Eastern Ecology Working Group n.d., Ehrenfeld 1977, Fike 1999, NRCS 2001b, NRCS 2004, Perles et al. 2006c, Podniesinski et al. 2006, Soil Conservation Service 1987



Figure F-10. Northeastern Modified Successional Forest in the Saratoga Battlefield Unit (plot SARA.117, NYNHP T08, photo no. 569). 7/22/2004. NAD 1983 / UTM easting 609638, northing 4761720.

Local Name: Northeastern Oak - Red Maple Successional Forest (CEGL006506)

SYNONYMS

USNVC English Name:	**Northern Red Oak - Red Maple - Birch species - Eastern White Pine Forest**
USNVC Scientific Name:	***Quercus rubra* - *Acer rubrum* - *Betula* spp. - *Pinus strobus* Forest**
USNVC Identifier:	**CEGL006506**

LOCAL INFORMATION

Environmental Description: This mixed, successional forest develops on land that has been severely disturbed; at Saratoga it occurs in widely variable environmental settings from slopes to flats at elevations that range from 34 to 113 m (110-370 feet). Soils are quite variable and include shallow to very deep, very poorly drained to somewhat excessively well-drained silt loam, loamy fine sand, mucky silty clay loam, and rocky channery silt loam in the Claverack, Hudson, Scio, Oakville, Manlius-Nassau complex, Rhinebeck, Bernardston-Manlius-Nassau complex, Bernardston, Nassau-Rock outcrop complex, and Madalin series (NRCS 2004). The underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino, Austin Glen, and Canajoharie formations. This community is most frequently surrounded by croplands, pasturelands, and fragmented urban or residential development, but it can be adjacent to a wide variety of natural communities as well, including Eastern Cattail Marsh (CEGL006153), Northeastern Old Field (CEGL006107), Little Bluestem Old Field (CEGL006333), Northeastern Successional Shrubland (CEGL006451), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), White Pine - Oak Forest (CEGL006293), Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301), Northeastern Dry Oak - Hickory Forest (CEGL006336), Dry, Rich Oak - Hickory Forest (CEGL006301), Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046), and Semi-rich Northern Hardwood Forest (CEGL006211).

Vegetation Description: The somewhat closed (70-75%) tree canopy is codominated by *Acer rubrum* (red maple) and *Pinus strobus* (eastern white pine) with *Acer saccharum* (sugar maple) and additional associates that include *Prunus serotina* (black cherry), *Betula populifolia* (gray birch), *Ulmus americana* (American elm), *Fraxinus americana* (white ash), *Populus tremuloides* (quaking aspen), *Quercus rubra* (northern red oak), and *Ostrya virginiana* (hophornbeam). Canopy trees are 20-25 m tall; subcanopy trees are 15 m tall. The subcanopy (30-35% cover) is also dominated by *Acer rubrum* (red maple) with *Fagus grandifolia* (American beech), *Carya glabra* (pignut hickory), *Pinus strobus* (eastern white pine), and *Rhamnus cathartica* (common buckthorn). The tall-shrub layer is sparse (1-5% cover) with *Hamamelis virginiana* (American witchhazel), *Cornus racemosa* (gray dogwood), and scattered saplings of the species listed above. Short shrubs are more abundant (20-25% cover) and are dominated by seedlings of *Acer saccharum* (sugar maple) and other canopy and subcanopy species, with *Rubus flagellaris* (northern dewberry), *Vaccinium corymbosum* (highbush blueberry), *Spiraea tomentosa* (steeplebush), *Lonicera tatarica* (Tatarian honeysuckle), *Spiraea alba* var. *latifolia* (white meadowsweet), *Rubus occidentalis* (black raspberry), *Rubus*

allegheniensis (Allegheny blackberry), and *Viburnum dentatum* (southern arrowwood). Scattered vines, commonly *Parthenocissus quinquefolia* (Virginia creeper) and *Celastrus orbiculatus* (Oriental bittersweet), are also present. The herbaceous layer is somewhat dense in parts (45-50% cover) and is dominated by *Onoclea sensibilis* (sensitive fern) and *Carex pensylvanica* (Pennsylvania sedge) with associates that include *Elymus hystrix* (eastern bottlebrush grass), *Veronica serpyllifolia* (thymeleaf speedwell), *Galium circaezans* (licorice bedstraw), *Osmunda claytoniana* (interrupted fern), *Leersia virginica* (whitegrass), *Asclepias syriaca* (common milkweed), *Solidago gigantea* (giant goldenrod), *Dryopteris intermedia* (intermediate woodfern), *Oxalis stricta* (common yellow oxalis), *Potentilla simplex* (common cinquefoil), *Thelypteris noveboracensis* (New York fern), *Galium mollugo* (false baby's breath), *Solidago rugosa* (wrinkleleaf goldenrod), *Prunella vulgaris* (common selfheal), *Pycnanthemum tenuifolium* (narrowleaf mountainmint), *Maianthemum canadense* (Canada mayflower), *Alliaria petiolata* (garlic mustard), *Potentilla canadensis* (dwarf cinquefoil), *Penstemon digitalis* (talus slope penstemon), *Carex hirsutella* (fuzzy wuzzy sedge), *Carex granularis* (limestone meadow sedge), *Athyrium filix-femina* (common ladyfern), and *Hackelia virginiana* (beggarslice).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood), *Hamamelis virginiana* (American witchhazel), *Quercus rubra* (northern red oak)
Short shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Rubus flagellaris* (northern dewberry), *Vaccinium corymbosum* (highbush blueberry)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)
Nonvascular	Moss	*Polytrichum commune* (polytrichum moss)

Characteristic Species: *Acer rubrum* (red maple), *Dryopteris intermedia* (intermediate woodfern), *Onoclea sensibilis* (sensitive fern), *Pinus strobus* (eastern white pine)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Successional northern hardwoods	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: This association may contain *Pinus strobus* (eastern white pine), but it should not be dominant. White pine-dominated successional forests at Saratoga National Historical Park are classified as White Pine Successional Forest (CEGL007944). The Northeastern Oak - Red Maple Successional Forest was mapped extensively at SARA during early drafts of the vegetation map. The accuracy assessment suggested that nearly all is area was better considered the White Pine Successional Forest (CEGL007944). The Northeastern Oak - Red Maple Successional Forest is now considered an infrequent type at SARA, with most stands in the Battlefield Unit.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.110

Accuracy Assessment Observations: SARA.104 (AA), SARA.105 (AA), SARA.118 (AA), SARA.157 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Hardwood and Conifer Ruderal Forest Group (G030)
Alliance*	*Quercus rubra - (Acer saccharum)* Forest Alliance (A.251)
Alliance (English name)*	Northern Red Oak - (Sugar Maple) Forest Alliance
Association	*Quercus rubra - Acer rubrum - Betula* spp. *- Pinus strobus* Forest
Association (English name)	Northern Red Oak - Red Maple - Birch species - Eastern White Pine Forest
Ecological System(s)	Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES201.563) Northern Atlantic Coastal Plain Hardwood Forest (CES203.475) Laurentian-Acadian Northern Pine-(Oak) Forest (CES201.719)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This deciduous to mixed forest of northern New England is a broadly defined community, usually developing after severe disturbance, including clearing, pasturing, logging, fires, severe hurricanes, or simply heavily fragmented residential development. While in some cases it is a successional type, it may persist in some settings, particularly where soils are limited, for example along ridgelines. The canopy trees are mostly 40-100 years old. The canopy ranges from somewhat open to closed; the shrub, herb and bryoid layers are patchy and rarely extensive. Composition is variable depending on site history. The canopy is usually mostly deciduous, dominated by a

heterogeneous mixture of *Quercus rubra* (northern red oak), *Acer rubrum* (red maple), *Pinus strobus* (eastern white pine), and *Fagus grandifolia* (American beech). Typically these occur in association with light-requiring, wind-dispersed trees such as *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), *Betula papyrifera* (paper birch), *Betula populifolia* (gray birch), *Fraxinus americana* (white ash), and *Prunus serotina* (black cherry). Minor associates include *Picea rubens* (red spruce) and *Acer saccharum* (sugar maple). Understory species tend to reflect predisturbance conditions and include *Acer pensylvanicum* (striped maple), *Corylus cornuta* (beaked hazelnut), *Viburnum acerifolium* (mapleleaf viburnum), or *Hamamelis virginiana* (American witchhazel) in the shrub layer. *Vaccinium angustifolium* (lowbush blueberry) is a typical low shrub, although it does not form a coherent layer. *Pteridium aquilinum* (western brackenfern) is characteristic and may be abundant in the herbaceous layer; other common herbs include *Trientalis borealis* (starflower), *Maianthemum canadense* (Canada mayflower), *Deschampsia flexuosa* (wavy hairgrass), and *Aralia nudicaulis* (wild sarsaparilla). The bryophyte layer is of variable cover and may include *Polytrichum commune* (polytrichum moss) and *Dicranum polysetum* (dicranum moss). This association is differentiated from similar forests and woodlands by its thin canopy that usually includes early-successional species, particularly *Acer rubrum* (red maple), low abundance of tolerant hardwoods other than red oak, and the lack of a well-developed heath shrub layer (as is typical in oak-pine woodlands). Unlike oak and oak-pine forests to the south, *Quercus rubra* (northern red oak) is the only oak species present in any abundance.

Environmental Description: This deciduous to mixed forest of northern New England is a broadly defined community, usually developing after severe disturbance including clearing, pasturing, logging, fires, severe hurricanes, or simply heavily fragmented residential development. While in some cases it is a successional type, it may persist in some settings, particularly where soils are limited, for example along ridgelines.

Vegetation Description: Canopy trees are mostly 40-100 years old. The canopy ranges from somewhat open to closed; the shrub, herb, and bryoid layers are patchy and rarely extensive. Composition is variable depending on site history. The canopy is usually mostly deciduous, dominated by a heterogeneous mixture of *Quercus rubra* (northern red oak), *Pinus strobus* (eastern white pine), and *Fagus grandifolia* (American beech). Typically these occur in association with light-requiring, wind-dispersed trees such as *Acer rubrum* (red maple), *Populus tremuloides* (quaking aspen), *Populus grandidentata* (bigtooth aspen), *Betula papyrifera* (paper birch), *Betula populifolia* (gray birch), *Fraxinus americana* (white ash), and *Prunus serotina* (black cherry). Minor associates include *Picea rubens* (red spruce) and *Acer saccharum* (sugar maple). Understory species tend to reflect predisturbance conditions and include *Acer pensylvanicum* (striped maple), *Corylus cornuta* (beaked hazelnut), *Viburnum acerifolium* (mapleleaf viburnum), or *Hamamelis virginiana* (American witchhazel) in the shrub layer. *Vaccinium angustifolium* (lowbush blueberry) is a typical low shrub. *Pteridium aquilinum* (western brackenfern) is characteristic, and may be abundant, in the herbaceous layer; other common herbs include *Trientalis borealis* (starflower), *Maianthemum canadense* (Canada mayflower), *Deschampsia flexuosa* (wavy hairgrass), and *Aralia nudicaulis* (wild

sarsaparilla). The bryophyte layer is of variable cover and may include *Polytrichum commune* (polytrichum moss) and *Dicranum polysetum* (dicranum moss).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech), *Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer pensylvanicum* (striped maple), *Corylus cornuta* (beaked hazelnut), *Hamamelis virginiana* (American witchhazel), *Viburnum acerifolium* (mapleleaf viburnum)
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium angustifolium* (lowbush blueberry)
Herb (field)	Fern or fern ally	*Pteridium aquilinum* (western brackenfern)

Characteristic Species: *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Pteridium aquilinum* (western brackenfern), *Quercus rubra* (northern red oak), *Vaccinium angustifolium* (lowbush blueberry)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This forest occurs in northern and central New England.

States/Provinces: CT, MA, ME, NB, NH, NY, PA, RI, VT

Federal Lands: NPS (Acadia, Minute Man, Saratoga, Upper Delaware); USFWS (Assabet River, Eastern Massachusetts, Great Meadows, Moosehorn?, Oxbow)

CONSERVATION STATUS

Rank: GNR (2-Jul-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This association was first described from the Northern Appalachian-Acadian ecoregion, where it approaches a matrix landscape pattern in the southern portions of the region while being absent from areas to the north. Similar forests extend southward. Further work in Lower New England suggests that this type may represent an earlier successional version of *Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia* Forest (CEGL006293), and possibly of other later-successional types, distinguished by the preponderance of *Acer rubrum* (red maple) in the canopy.

Similar Associations:

(Pinus strobus, Quercus rubra) / Danthonia spicata Acid Bedrock Wooded Herbaceous Vegetation (CEGL005101)
Betula lenta - Acer rubrum / Lycopodium annotinum - Dennstaedtia punctilobula Forest (CEGL008503)
Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia Forest (CEGL006293)
Quercus (rubra, velutina, alba) - Betula lenta - (Pinus strobus) Forest (CEGL006454)
Quercus rubra - (Quercus prinus) / Vaccinium spp. / *Deschampsia flexuosa* Woodland (CEGL006134)
Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium Forest (CEGL006173)

Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Gawler 2002, Kuchler 1956, Moore and Taylor 1927, NRCS 2004, Sperduto 2000a, Thompson and Jenkins 1992



Figure F-11. Northeastern Oak - Red Maple Successional Forest in the Saratoga Battlefield Unit (AA point SARA.104, NYNHP 199). 8/8/2006. NAD 1983 / UTM easting 611073, northing 4761539

Local Name: White Pine Plantation (CEGL007178)

SYNONYMS

USNVC English Name: Eastern White Pine Planted Forest
USNVC Scientific Name: *Pinus strobus* Planted Forest
USNVC Identifier: CEGL007178

LOCAL INFORMATION

Environmental Description: This pine plantation primarily occurs at elevations between 60 and 107 m (200-350 feet) at Saratoga, with one patch at 28 m (90 feet). Soils are very deep, poorly drained to well-drained silt loams and loamy fine sands in the Hudson, Oakville, Bernardston, Rhinebeck, and Sun series (NRCS 2004). The underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. This association is surrounded by a range of natural and cultural communities, including residential development, cemeteries, upland forests and fields [Early-Successional Woodland/Forest (CEGL006303), Black Locust Successional Forest (CEGL007279), Northeastern Old Field (CEGL006107), White Pine - Oak Forest (CEGL006293)] and wetland types [Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), Mixed Forb Marsh (CEGL006446)].

Vegetation Description: This plantation forest is strongly dominated by a near monoculture of *Pinus strobus* (eastern white pine) with sparse amounts of *Acer saccharum* (sugar maple), *Ulmus americana* (American elm), *Acer rubrum* (red maple), and *Fraxinus americana* (white ash) in the canopy. The same species are present in the open (less than 15% cover) subcanopy layer with *Rhamnus cathartica* (common buckthorn). Both the tall- and short-shrub layers have about 15% cover and are dominated by *Lonicera tatarica* (Tatarian honeysuckle). Additional tall shrubs are *Rhamnus cathartica* (common buckthorn) and *Fraxinus americana* (white ash); in addition to the species listed above, short shrubs include *Rubus occidentalis* (black raspberry) and *Rubus allegheniensis* (Allegheny blackberry). Vines, primarily *Parthenocissus quinquefolia* (Virginia creeper), are sparse to absent. Herbaceous species, with between 10 and 15% cover, are *Leersia virginica* (whitegrass), *Thymus pulegioides* (lemon thyme), *Oxalis stricta* (common yellow oxalis), *Veronica officinalis* (common gypsyweed), *Thelypteris noveboracensis* (New York fern), *Clinopodium vulgare* (wild basil), *Potentilla canadensis* (dwarf cinquefoil), and *Arisaema triphyllum* (Jack in the pulpit).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree subcanopy	Broad-leaved deciduous tree	*Rhamnus cathartica* (common buckthorn)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)

Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Graminoid	*Leersia virginica* (whitegrass)

Characteristic Species: *Lonicera tatarica* (Tatarian honeysuckle), *Pinus strobus* (eastern white pine)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Pine plantation	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit (at Victory Woods) and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.

Classification Comments: White Pine Plantation may look similar to White Pine Successional Forest (CEGL007944), which is also prevalent at Saratoga National Historical Park. Polygons that contain even-aged white pine planted in obvious rows and/or with few associated species in all strata are classified as White Pine Plantation (CEGL007178).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.11, SARA.23, SARA.134, SARA.140

Accuracy Assessment Observations: SARA.137 (AA), SARA.194 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)
Group	Northern and Central Conifer and Hardwood Plantation Group (G032)
Alliance*	*Pinus strobus* Planted Forest Alliance (A.98)
Alliance (English name)*	Eastern White Pine Planted Forest Alliance
Association	*Pinus strobus* Planted Forest
Association (English name)	Eastern White Pine Planted Forest
Ecological System(s)	Semi-natural / Altered Vegetation and Conifer Plantations (CES203.074)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This white pine plantation type is found throughout the northeastern and midwestern United States and adjacent Canada. Stands contain plantations of *Pinus strobus* (eastern white pine) that are maintained for the extraction of forest products. Some have been planted as reclamation projects (e.g., following strip-mining). At maturity, the tree canopy is usually dense and contains a monospecific layer of *Pinus strobus* (eastern white pine). *Pinus resinosa* (red pine) or

Pinus virginiana (Virginia pine) is occasionally present in small amounts. In older stands or gaps, regenerating trees may include *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), and *Prunus serotina* (black cherry); *Robinia pseudoacacia* (black locust) and *Betula lenta* (sweet birch) are occasionally present. *Acer pensylvanicum* (striped maple) and *Ostrya virginiana* (hophornbeam) are common small trees. The shrub layer is typically sparse and mostly consists of smaller individuals of the tree species. The field layer varies from sparse to absent; it may be locally well-developed in small openings, with variable composition. In some stands, mosses may be abundant. Susceptibility to a variety of pests or diseases, including white pine blister rust (*Cronartium ribicola*) and southern pine beetle (*Dendroctonus frontalis*), has had some impact on its commercial use.

Environmental Description: Stands contain plantations of *Pinus strobus* (eastern white pine) that are maintained for the extraction of forest products. The type does well on a variety of soils. Some have been planted on strip-mine reclamation sites.

Vegetation Description: The tree canopy at maturity is usually dense and contains a monospecific layer of *Pinus strobus* (eastern white pine). *Pinus resinosa* (red pine) or *Pinus virginiana* (Virginia pine) is occasionally present in small amounts. In older stands or gaps, regenerating trees may include *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), and *Prunus serotina* (black cherry); *Robinia pseudoacacia* (black locust) and *Betula lenta* (sweet birch) are occasionally present. *Acer pensylvanicum* (striped maple) and *Ostrya virginiana* (hophornbeam) are common small trees. The shrub layer is typically sparse and mostly consists of smaller individuals of the tree species. The field layer varies from sparse to absent; it may be locally well-developed in small openings, with variable composition. In some stands, mosses may be abundant.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)

Characteristic Species: *Pinus strobus* (eastern white pine)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This white pine plantation type is found throughout the northeastern and midwestern United States and adjacent Canada.

States/Provinces: GA, KY, MD, NC, NH, NY, PA, SC, TN, VA, VT, WV

Federal Lands: DOD (Camp Dawson); NPS (Blue Ridge Parkway, Booker T. Washington, Chickamauga-Chattanooga, Marsh-Billings-Rockefeller, New River Gorge, Saratoga, Valley Forge); USFS (Chattahoochee, Chattahoochee (Southern Blue Ridge), Cherokee, Daniel Boone, George Washington, Jefferson, Nantahala, Pisgah, Sumter, Sumter (Mountains)); USFWS (Chesapeake Marshlands)

CONSERVATION STATUS

Rank: GNA (cultural) (8-Aug-2000)

Reasons: This community represents vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation. It is not a conservation priority and does not receive a conservation rank.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: There was a lot of planting of white pine from the 1930s into the 1950s, but there has been very little planting since then (P. Manion pers. comm. 2001). On the Daniel Boone National Forest of Kentucky, *Pinus strobus* (eastern white pine) plantings are of limited extent and are related to wildlife plantings. In the southern part of this type's range, there has been some damage from southern pine beetle (*Dendroctonus frontalis*). These plantations have been observed in the Peters Mountain area (James River Ranger District) and various other sites in the George Washington and Jefferson national forests.

Similar Associations:

Pinus spp. Planted Forest (CEGL006313)

Pinus strobus Successional Forest (CEGL007944)

Related Concepts:

IF3b. Plantation (Hardwood or Conifer) (Allard 1990) B

Unclassified Clearcut Regeneration (Fleming and Moorhead 2000)

SOURCES

Description Authors: D. Faber-Langendoen, mod. S.C. Gawler

References: Allard 1990, Fleming and Coulling 2001, Fleming and Moorhead 2000, NRCS 2004, Reschke 1990, Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst 2001a, Vanderhorst 2001b, Vanderhorst et al. 2007



Figure F-12. White Pine Plantation in the Saratoga Battlefield Unit (plot SARA.134, NYNHP W10, photo no. 649). 9/15/2004. NAD 1983 / UTM easting 611727, northing 4760907.

Local Name: Norway Spruce Plantation (CEGL007167)

SYNONYMS

USNVC English Name: Norway Spruce Planted Forest
USNVC Scientific Name: *Picea abies* Planted Forest
USNVC Identifier: CEGL007167

LOCAL INFORMATION

Environmental Description: This plantation forest is located at 85 m (280 feet) in elevation on loamy fine sand in the Oakville series. The soil is very deep, well-drained, and formed in water-sorted sand (NRCS 2004). The underlying bedrock is shale and siltstone in the Mt. Merino Formation. The community is surrounded by mowed lawn with trees.

Vegetation Description: This plantation forest is dominated by the exotic species *Picea abies* (Norway spruce), which makes up 70-100% of the canopy. The understory is typically sparse with little, if any, spruce regeneration. Hardwood regeneration and herbaceous species composition tend to reflect the pre-plantation forest types.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Picea abies* (Norway spruce)

Characteristic Species: *Picea abies* (Norway spruce)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	SNA	=	1	Spruce-fir plantation	Edinger et al. 2002

Local Range: This association is located in the area mapped outside of the Old Saratoga Unit, west of Victory Woods.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann.

Classification Plots: None

Accuracy Assessment Observations: None

Reference Observations: SARA.246

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Eastern North American Ruderal Forest and Plantation (M013)

Group	Northern and Central Conifer and Hardwood Plantation Group (G032)
Alliance*	*Picea abies* Planted Forest Alliance (A.91)
Alliance (English name)*	Norway Spruce Planted Forest Alliance
Association	*Picea abies* Planted Forest
Association (English name)	Norway Spruce Planted Forest
Ecological System(s)	Semi-natural / Altered Vegetation and Conifer Plantations (CES203.074)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: These plantation forests are dominated by the exotic species *Picea abies* (Norway spruce), which makes up 70-100% of the canopy. The understory is typically sparse with little, if any, spruce regeneration. Hardwood regeneration and herbaceous species composition tend to reflect the pre-plantation forest types. In the Southeast this occurs as experimental plantations.

Environmental Description: Information not available.

Vegetation Description: These plantation forests are dominated by the exotic species *Picea abies* (Norway spruce), which makes up 70-100% of the canopy. The understory is typically sparse with little, if any, spruce regeneration. Hardwood regeneration and herbaceous species composition tend to reflect the pre-plantation forest types.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Picea abies* (Norway spruce)

Characteristic Species: *Picea abies* (Norway spruce)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: Information not available.

States/Provinces: ME, NC, NY, PA, VA?, VT

Federal Lands: NPS (Great Smoky Mountains?, Marsh-Billings-Rockefeller, Saratoga); USFWS (Aroostook, Erie)

CONSERVATION STATUS

Rank: GNA (cultural) (8-Aug-2000)

Reasons: This community represents vegetation which has been planted in its current location by humans and/or is treated with annual tillage, a modified conservation tillage, or other intensive management or manipulation. It is not a conservation priority and does not receive a conservation rank.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations: Information not available.

Related Concepts:

IF3b. Plantation (Hardwood or Conifer) (Allard 1990) B

SOURCES
Description Authors: S.C. Gawler
References: Allard 1990, NRCS 2004, Southeastern Ecology Working Group n.d.



Figure F-13. Norway Spruce Plantation in Saratoga Schuylerville (AA point SARA.246, NYNHP 356). 8/25/2006. NAD 1983 / UTM easting 614234, northing 4772014.

Local Name: Hemlock - Beech - Oak Forest (CEGL006088)

SYNONYMS

USNVC English Name: Hemlock - Beech Northern Red Oak Forest
USNVC Scientific Name: *Tsuga canadensis - Fagus grandifolia - Quercus rubra* Forest
USNVC Identifier: CEGL006088

LOCAL INFORMATION

Environmental Description: At Saratoga, this dry-mesic evergreen-deciduous forest occurs on mid to low slopes, between 40 and 76 m (130-250 feet) in elevation. Soils are very deep, moderately well-drained to well-drained silt loams and loamy fine sands in the Hudson, Oakville, and Bernardston series (NRCS 2004). Underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. Generally, the forest is adjacent to cropland or other upland forest types, including White Pine - Oak Forest (CEGL006293), Northeastern Dry Oak - Hickory Forest (CEGL006336), Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301), Semi-rich Northern Hardwood Forest (CEGL006211), Northeastern Oak - Red Maple Successional Forest (CEGL006506), and White Pine Successional Forest (CEGL007944).

Vegetation Description: This association is dominated by *Tsuga canadensis* (eastern hemlock) with *Quercus rubra* (northern red oak) as a codominant. Additional canopy species are *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Betula lenta* (sweet birch), *Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Prunus serotina* (black cherry), and *Betula papyrifera* (paper birch). The canopy is typically 20 to 25 m tall with canopy cover greater than 80%. The subcanopy is between 10 and 15 m in height and has about 45% cover. It is also dominated by *Tsuga canadensis* (eastern hemlock) with many of the canopy species listed above as well as *Acer rubrum* (red maple), *Amelanchier arborea* (common serviceberry), *Ostrya virginiana* (hophornbeam), *Carya ovata* (shagbark hickory), and *Betula alleghaniensis* (yellow birch). The tall-shrub layer is sparse (less than 10% cover) and is, similarly, dominated by *Tsuga canadensis* (eastern hemlock) with sprouts of *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), and *Hamamelis virginiana* (American witchhazel). The short-shrub layer is also sparse (less than 5 % cover) and is dominated by sprouts of *Fagus grandifolia* (American beech) with *Vaccinium pallidum* (Blue Ridge blueberry), *Viburnum acerifolium* (mapleleaf viburnum), and seedlings of the previously-listed species. Herbaceous species are also sparse, with less than 15% cover. They include a diverse suite of ferns, including *Osmunda claytoniana* (interrupted fern), *Thelypteris noveboracensis* (New York fern), *Polystichum acrostichoides* (Christmas fern), *Polypodium virginianum* (rock polypody), *Athyrium filix-femina* (common ladyfern), *Dryopteris intermedia* (intermediate woodfern), *Adiantum pedatum* (northern maidenhair), and *Phegopteris hexagonoptera* (broad beechfern), with graminoids *Carex pensylvanica* (Pennsylvania sedge), *Brachyelytrum erectum* (bearded shorthusk), *Carex blanda* (eastern woodland sedge), *Carex platyphylla* (broadleaf sedge), and *Piptatherum racemosum* (blackseed ricegrass), and

forbs *Arisaema triphyllum* (Jack in the pulpit), *Eurybia divaricata* (white wood aster), and *Maianthemum canadense* (Canada mayflower).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Tsuga canadensis* (eastern hemlock)
Tree canopy	Broad-leaved deciduous tree	*Quercus rubra* (northern red oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fagus grandifolia* (American beech)
Tall shrub/sapling	Needle-leaved shrub	*Tsuga canadensis* (eastern hemlock)
Herb (field)	Fern or fern ally	*Osmunda claytoniana* (interrupted fern), *Thelypteris noveboracensis* (New York fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Arisaema triphyllum* (Jack in the pulpit), *Betula lenta* (sweet birch), *Fagus grandifolia* (American beech), *Polystichum acrostichoides* (Christmas fern), *Quercus rubra* (northern red oak), *Tsuga canadensis* (eastern hemlock)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Hemlock-northern hardwood forest	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: The percent cover of *Quercus rubra* (northern red oak), *Betula lenta* (sweet birch), and other drier indicators (CEGL006088) should be greater than *Acer saccharum* (sugar maple), *Betula alleghaniensis* (yellow birch), and other mesic indicators (CEGL006109).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.13, SARA.19, SARA.20, SARA.133, SARA.147, SARA.148, SARA.153, SARA.184

Accuracy Assessment Observations: SARA.20 (AA), SARA.69 (AA), SARA.76 (AA), SARA.91 (AA), SARA.92 (AA), SARA.96 (AA), SARA.97 (AA)

Reference Observations: SARA.225, SARA.232

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Tsuga canadensis - Betula alleghaniensis* Forest Alliance (A.412)
Alliance (English name)*	Eastern Hemlock - Yellow Birch Forest Alliance
Association	*Tsuga canadensis - Fagus grandifolia - Quercus rubra* Forest

Association (English name)	Hemlock - Beech Northern Red Oak Forest
Ecological System(s)	Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)
	Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES202.563)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association comprises dry-mesic hemlock-mixed hardwood forests of the northeastern United States. It occurs on dry to dry-mesic, nutrient-poor, well-drained, often stony sandy loams or loamy sands over acidic bedrock. The canopy is a mixture of *Tsuga canadensis* (eastern hemlock), with *Fagus grandifolia* (American beech) and/or *Quercus rubra* (northern red oak) in variable proportions depending on soil (site) and disturbance characteristics. The overstory can range from mostly coniferous to mostly deciduous; drier sites tend to have more abundant beech or oak, and cooler sites tend to have more abundant hemlock. Associated tree species include *Betula lenta* (sweet birch) (sometimes replaced by *Betula papyrifera* (paper birch) at the northern end of this type's range), *Pinus strobus* (eastern white pine), and *Acer rubrum* (red maple). Shrubs are often sparse but locally abundant and, in addition to saplings of canopy species, include *Hamamelis virginiana* (American witchhazel), *Acer pensylvanicum* (striped maple), *Viburnum acerifolium* (mapleleaf viburnum), *Kalmia latifolia* (mountain laurel), and in the south *Ilex montana* (mountain holly). Though heaths may be present, they are rarely prominent. The herb layer is generally sparse but usually includes several of the following: *Mitchella repens* (partridgeberry), *Lycopodium digitatum* (fan clubmoss), *Lycopodium obscurum* (rare clubmoss), *Lycopodium annotinum* (stiff clubmoss), *Epifagus virginiana* (beechdrops), *Gaultheria procumbens* (eastern teaberry), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Medeola virginiana* (Indian cucumber), *Aralia nudicaulis* (wild sarsaparilla), *Uvularia sessilifolia* (sessileleaf bellwort), *Pteridium aquilinum* (western brackenfern), *Dryopteris intermedia* (intermediate woodfern), *Monotropa uniflora* (Indianpipe), and occasionally *Lycopodium dendroideum* (tree groundpine), *Coptis trifolia* (threeleaf goldthread), and *Dennstaedtia punctilobula* (eastern hayscented fern).

Environmental Description: This forest occurs on dry to dry-mesic, nutrient-poor, well-drained, often stony sandy loams or loamy sands. Underlying bedrock is acidic. In Virginia, it occupies extremely acidic (mean pH = 3.8), infertile silt loams on mesic to submesic valley sideslopes and broad, convex ridges at elevations from 1000-1200 m. In New England, it is a common forest type found on dry-mesic acidic soils on various landscape settings.

Vegetation Description: The canopy is a mixture of *Tsuga canadensis* (eastern hemlock) with *Fagus grandifolia* (American beech) and/or *Quercus rubra* (northern red oak) in variable proportions depending on soil (site) and disturbance characteristics; drier sites tend to have more abundant beech or oak and cooler sites tend to have more abundant hemlock. Associated tree species include *Betula lenta* (sweet birch) (sometimes replaced by *Betula papyrifera* (paper birch) at the northern end of this type's range), *Pinus strobus* (eastern white pine), and *Acer rubrum* (red maple). Shrubs are often sparse but locally abundant and, in addition to saplings of canopy species, include *Hamamelis virginiana* (American witchhazel), *Acer pensylvanicum* (striped maple), *Viburnum acerifolium* (mapleleaf viburnum), *Kalmia latifolia* (mountain laurel), and in the south *Ilex montana* (mountain

holly). Though heaths may be present, they are rarely prominent. The herb layer is generally sparse but usually includes several of the following: *Mitchella repens* (partridgeberry), *Lycopodium digitatum* (fan clubmoss), *Lycopodium obscurum* (rare clubmoss), *Lycopodium annotinum* (stiff clubmoss), *Epifagus virginiana* (beechdrops), *Gaultheria procumbens* (eastern teaberry), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Medeola virginiana* (Indian cucumber), *Aralia nudicaulis* (wild sarsaparilla), *Uvularia sessilifolia* (sessileleaf bellwort), *Dryopteris intermedia* (intermediate woodfern), *Monotropa uniflora* (Indianpipe), and occasionally *Lycopodium dendroideum* (tree groundpine), *Coptis trifolia* (threeleaf goldthread), and *Dennstaedtia punctilobula* (eastern hayscented fern).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Tsuga canadensis* (eastern hemlock)
Tree canopy	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech), *Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Betula lenta* (sweet birch)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer pensylvanicum* (striped maple), *Hamamelis virginiana* (American witchhazel), *Viburnum acerifolium* (mapleleaf viburnum)
Tall shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia* (mountain laurel)
Herb (field)	Forb	*Aralia nudicaulis* (wild sarsaparilla), *Trientalis borealis* (starflower)

Characteristic Species: *Betula lenta* (sweet birch), *Dryopteris intermedia* (intermediate woodfern), *Fagus grandifolia* (American beech), *Quercus rubra* (northern red oak), *Tsuga canadensis* (eastern hemlock)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association is widespread in southern New England and ranges south locally in the northern Piedmont and high Allegheny Mountains to Virginia and West Virginia. In Virginia, the type is confined to the Allegheny Mountain / Laurel Fork area in northwestern Highland County.

States/Provinces: CT, MA, ME, NH, NY, PA, RI, VA:S1, VT

Federal Lands: NPS (Marsh-Billings-Rockefeller, Saint-Gaudens, Saratoga, Upper Delaware); USFS (George Washington)

CONSERVATION STATUS

Rank: G4G5 (26-Jun-1998)

Reasons: This community type is widely distributed in the northern part of its range. Its long-term viability is threatened by pathogens associated with its two dominant canopy trees.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: At least in the southern portion of this type's range, the *Tsuga canadensis* (eastern hemlock) component of this community type appears to have been heavily reduced by past disturbances because of this species' commercial timber value and its vulnerability to fire.

Similar Associations:

Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia Forest (CEGL006293)
Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium Forest (CEGL006173)
Tsuga canadensis - (Betula alleghaniensis) - Picea rubens / Cornus canadensis Forest (CEGL006129)
Tsuga canadensis - Betula alleghaniensis - Acer saccharum / Dryopteris intermedia Forest (CEGL006109)
Tsuga canadensis - Fagus grandifolia - (Acer saccharum) Great Lakes Forest (CEGL005042)
Tsuga canadensis - Fagus grandifolia - Quercus (prinus, alba) Forest (CEGL006474)

Related Concepts:

Fagus grandifolia - Tsuga canadensis / Dryopteris intermedia Forest (Fleming and Coulling 2001) =
Fagus grandifolia / Dryopteris intermedia Association (Fleming and Moorhead 1996) =
CNE dry transitional forest on sandy / gravelly soils (Rawinski 1984) ?
CNE mesic conifer [transition] forest on acidic bedrock/till (Rawinski 1984) B
CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B
Central New England mesic conifer forest on acidic bedrock / till (Rawinski 1984) B
Eastern Hemlock: 23 (Eyre 1980) B
Hemlock Forest (Thompson 1996) B

SOURCES

Description Authors: G. Fleming and P. Coulling, mod. S.L. Neid and S.C. Gawler

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Eyre 1980, Fike 1999, Fleming and Coulling 2001, Fleming and Moorhead 1996, Fleming et al. 2001, Gawler 2002, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Reschke 1990, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000, VDNH 2003



Figure F-14. Hemlock - Beech - Oak Forest in the Saratoga Battlefield Unit (plot SARA.19, NYNHP D1, photo no. 20). 6/18/2003. NAD 1983 / UTM easting 612947, northing 4762089.

Local Name: Hemlock - Northern Hardwood Forest (CEGL006109)

SYNONYMS

USNVC English Name: **Eastern Hemlock - Yellow Birch - Sugar Maple / Intermediate Woodfern Forest**

USNVC Scientific Name: ***Tsuga canadensis - Betula alleghaniensis - Acer saccharum / Dryopteris intermedia* Forest**

USNVC Identifier: **CEGL006109**

LOCAL INFORMATION

Environmental Description: This mixed forest occurs on a northeast-facing slope at 46 to 70 m (150-230 feet) in elevation at Saratoga. Soils are very deep, moderately well-drained silt loams and loamy fine sands in the Hudson and Oakville series (NRCS 2004), and the underlying bedrock is shale and sandstone in the Canajoharie Formation. Adjacent natural communities are Northeastern Dry Oak - Hickory Forest (CEGL006336) and White Pine - Oak Forest (CEGL006293).

Vegetation Description: This association is strongly dominated by *Tsuga canadensis* (eastern hemlock) with codominant *Acer saccharum* (sugar maple). The tree canopy is typically between 25 and 30 m tall with 75% cover. The subcanopy, which reaches 15 m tall with 35% cover, is dominated by *Fagus grandifolia* (American beech) with *Tsuga canadensis* (eastern hemlock). The tall-shrub layer is less dense, with 20% cover, and consists primarily of saplings of the canopy species. Herbaceous cover reaches 35% and is codominated by the ferns *Thelypteris noveboracensis* (New York fern) and *Adiantum pedatum* (northern maidenhair) with lesser amounts of *Amphicarpaea bracteata* (American hogpeanut), *Piptatherum racemosum* (blackseed ricegrass), *Eurybia divaricata* (white wood aster), *Dryopteris intermedia* (intermediate woodfern), *Ageratina altissima var. altissima* (white snakeroot), and *Onoclea sensibilis* (sensitive fern).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis* (eastern hemlock)
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple)
Tree subcanopy	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharum* (sugar maple)
Herb (field)	Forb	*Amphicarpaea bracteata* (American hogpeanut), *Eurybia divaricata* (white wood aster)
Herb (field)	Graminoid	*Piptatherum racemosum* (blackseed ricegrass)
Herb (field)	Fern or fern ally	*Adiantum pedatum* (northern maidenhair), *Thelypteris noveboracensis* (New York fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Adiantum pedatum* (northern maidenhair), *Amphicarpaea bracteata* (American hogpeanut), *Dryopteris intermedia* (intermediate woodfern), *Eurybia divaricata* (white wood aster), *Fagus grandifolia* (American beech), *Thelypteris noveboracensis* (New York fern), *Tsuga canadensis* (eastern hemlock)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Hemlock-northern hardwood forest	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park.
Classification Comments: The percent cover of *Acer saccharum* (sugar maple), *Betula alleghaniensis* (yellow birch), and other mesic indicators (CEGL006109) should be greater than *Quercus rubra* (northern red oak), *Betula lenta* (sweet birch), and other drier indicators (CEGL006088).
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: None
Accuracy Assessment Observations: SARA.50 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Tsuga canadensis - Betula alleghaniensis* Forest Alliance (A.412)
Alliance (English name)*	Eastern Hemlock - Yellow Birch Forest Alliance
Association	*Tsuga canadensis - Betula alleghaniensis - Acer saccharum / Dryopteris intermedia* Forest
Association (English name)	Eastern Hemlock - Yellow Birch - Sugar Maple / Intermediate Woodfern Forest
Ecological System(s)	Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association comprises hemlock - northern hardwood forests of the northeastern United States. This forest is associated with cool, dry-mesic to mesic sites and acidic soils, often on rocky, north-facing slopes. Soils can have a thick, poorly decomposed duff layer over sandy loams. *Tsuga canadensis* (eastern hemlock) is characteristic and usually dominant in the coniferous to mixed canopy. While hemlock generally forms at least 50% of the canopy, in some cases it may be as low as 25% relative dominance. Hardwood codominants include *Betula alleghaniensis* (yellow birch) or *Acer saccharum* (sugar maple), with *Fagus grandifolia* (American

beech) common but not usually abundant in all but the very southern portion of the range of this type. *Betula lenta* (sweet birch) may replace *Betula alleghaniensis* (yellow birch) in some areas. *Ostrya virginiana* (hophornbeam) may be present as a small tree. *Quercus* (oak) spp. and *Pinus strobus* (eastern white pine) tend to be absent or, if present, only occur with low abundance. The shrub layer may be dense to fairly open and often includes *Viburnum acerifolium* (mapleleaf viburnum) and *Acer pensylvanicum* (striped maple) in addition to *Tsuga canadensis* (eastern hemlock) regeneration. Herbs may be sparse, particularly in dense shade, but include *Dryopteris intermedia* (intermediate woodfern), *Medeola virginiana* (Indian cucumber), *Oxalis montana* (mountain woodsorrel), *Mitchella repens* (partridgeberry), *Maianthemum canadense* (Canada mayflower), *Uvularia sessilifolia* (sessileleaf bellwort), *Polystichum acrostichoides* (Christmas fern), *Trientalis borealis* (starflower), *Huperzia lucidula* (shining clubmoss), *Eurybia divaricata* (white wood aster), *Oclemena acuminata* (whorled wood aster), *Dennstaedtia punctilobula* (eastern hayscented fern), and *Thelypteris noveboracensis* (New York fern). Nonvascular plants may be well-developed, often characterized by the liverwort *Bazzania trilobata*. Diagnostic characteristics of this forest are the presence of *Betula alleghaniensis* (yellow birch) and *Acer saccharum* (sugar maple) and a lack of abundant *Quercus* (oak) spp., *Pinus strobus* (eastern white pine), or *Betula lenta* (sweet birch).
Environmental Description: This forest is associated with cool, dry-mesic to mesic sites and acidic soils, often on rocky, north-facing slopes. Soils can have a thick, poorly decomposed duff layer over sandy loams. In the southern part of the range, stands often occur in deep, sheltered ravines and along high-gradient mountain streams.
Vegetation Description: *Tsuga canadensis* (eastern hemlock) is dominant and forms at least 50% of the canopy. *Betula alleghaniensis* (yellow birch) can be codominant, with *Fagus grandifolia* (American beech) and *Acer saccharum* (sugar maple) common but not usually abundant in all but the very southern portion of the range for this type. At the southern end of the range (in Virginia and Maryland), *Liriodendron tulipifera* (tuliptree) may be an important overstory associate. The shrub layer may be dense to fairly open and often includes *Viburnum acerifolium* (mapleleaf viburnum) and *Acer pensylvanicum* (striped maple) in addition to *Tsuga canadensis* (eastern hemlock) regeneration. Herbs may be sparse, particularly in dense shade, but often include *Dryopteris intermedia* (intermediate woodfern), *Medeola virginiana* (Indian cucumber), *Oxalis montana* (mountain woodsorrel), *Mitchella repens* (partridgeberry), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower), *Huperzia lucidula* (shining clubmoss), *Eurybia divaricata* (white wood aster), and *Thelypteris noveboracensis* (New York fern). Nonvascular plants may be well-developed, often characterized by the liverwort *Bazzania trilobata*. Diagnostic characteristics of this forest are the presence of *Betula alleghaniensis* (yellow birch) and *Acer saccharum* (sugar maple) and a lack of abundant *Quercus* (oak) spp., *Pinus strobus* (eastern white pine), or *Betula lenta* (sweet birch).
Dynamics: Hemlock woolly adelgid (*Adelges tsugae*) is decimating hemlock stands in the eastern United States. *Betula lenta* (sweet birch) is a common colonizer following the death of hemlocks.
Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Tsuga canadensis* (eastern hemlock)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer pensylvanicum* (striped maple), *Viburnum acerifolium* (mapleleaf viburnum)
Herb (field)	Forb	*Maianthemum canadense* (Canada mayflower)

Characteristic Species: *Betula alleghaniensis* (yellow birch), *Carex albicans* (whitetinge sedge), *Dryopteris intermedia* (intermediate woodfern), *Huperzia lucidula* (shining clubmoss), *Maianthemum canadense* (Canada mayflower), *Medeola virginiana* (Indian cucumber), *Mitchella repens* (partridgeberry), *Oclemena acuminata* (whorled wood aster), *Thelypteris noveboracensis* (New York fern), *Tsuga canadensis* (eastern hemlock)
Other Noteworthy Species: Information not available.
USFWS Wetland System: not applicable

DISTRIBUTION

Range: This community is generally distributed in large patches from New Hampshire south through Pennsylvania, becoming more local in the north Atlantic Piedmont and restricted to local patches at higher elevations of the Central Appalachians in Maryland, West Virginia, and Virginia. In Virginia it is restricted to the northwestern part of the state, where occurrences are rather local but sometimes extensive.
States/Provinces: CT, MA, MD, NH, NJ:S3, NY, PA, RI, VA:S3, VT, WV?
Federal Lands: NPS (Delaware Water Gap, Johnstown Flood, Marsh-Billings-Rockefeller, Saratoga, Shenandoah, Upper Delaware); USFS (Finger Lakes, George Washington); USFWS (Erie)

CONSERVATION STATUS

Rank: G4? (31-Dec-1997)
Reasons: This association has a very large geographic distribution and occurs in large patches in the northern part of its range. All stands of this community are now highly threatened by the exotic insect pest hemlock woolly adelgid (*Adelges tsugae*), which causes decline and eventual mortality in *Tsuga canadensis* (eastern hemlock).

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: Many stands of this vegetation type in the national forests and Shenandoah National Park have been devastated during the past decade by adelgid-caused tree mortality. In some cases, 100% of the canopy hemlocks have been killed, littering the forest floor with downed wood and stimulating massive increases in understory growth, particularly of *Betula* (birch) spp. and *Acer pensylvanicum* (striped maple). Since there is no practical treatment for the adelgid on a landscape level, one can only hope that natural pathogens will emerge to keep the adelgid in check before all of our examples of this community are severely degraded or lost.
Similar Associations:

Betula alleghaniensis - (Tsuga canadensis) / Rhododendron maximum / (Leucothoe fontanesiana) Forest (CEGL007861)
Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium Forest (CEGL006173)
Tsuga canadensis - (Betula alleghaniensis) - Picea rubens / Cornus canadensis Forest (CEGL006129)
Tsuga canadensis - (Betula alleghaniensis, Quercus rubra) / Ilex montana / Rhododendron catawbiense Forest (CEGL008513)
Tsuga canadensis - Fagus grandifolia - Quercus (prinus, alba) Forest (CEGL006474)
Tsuga canadensis - Fagus grandifolia - Quercus rubra Forest (CEGL006088)

Related Concepts:

Betula alleghaniensis - Tsuga canadensis / Dryopteris intermedia - Huperzia lucidula Forest (Coulling and Rawinski 1999) F
Tsuga canadensis - Betula (alleghaniensis, lenta) / Dryopteris intermedia Forest (Fleming and Coulling 2001) =
Tsuga canadensis - Betula lenta - Betula alleghaniensis Association (Fleming and Moorhead 1996) F
Tsuga canadensis / Dryopteris intermedia / Bazzania trilobata Association (Rawinski et al. 1994) F
CNE dry transitional forest on sandy / gravelly soils (Rawinski 1984) ?
CNE mesic conifer [transition] forest on acidic bedrock/till (Rawinski 1984) B
CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B
Eastern Hemlock: 23 (Eyre 1980) B
Hemlock - Yellow Birch: 24 (Eyre 1980) B
Hemlock Forest (Thompson 1996) B
Mesic Hemlock-Hardwood Forest (Breden 1989) B

SOURCES

Description Authors: S.L. Neid, mod. S.C. Gawler and G.P. Fleming

References: Breden 1989, Breden et al. 2001, Coulling and Rawinski 1999, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1993, Eyre 1980, Fike 1999, Fleming and Coulling 2001, Fleming and Moorhead 1996, Fleming et al. 2001, Gawler 2002, Harrison 2004, Metzler and Barrett 2001, NAP pers. comm. 1998, NRCS 2004, Rawinski 1984, Rawinski et al. 1994, Smith 1983, Sperduto 2000a, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000, VDNH 2003

Local Name: White Pine - Hemlock Dry-Mesic Forest (CEGL006328)

SYNONYMS

USNVC English Name:	**Eastern White Pine - Eastern Hemlock Lower New England / Northern Piedmont Forest**
USNVC Scientific Name:	***Pinus strobus* - *Tsuga canadensis* Lower New England / Northern Piedmont Forest**
USNVC Identifier:	**CEGL006328**

LOCAL INFORMATION

Environmental Description: This evergreen to mixed forest occurs at elevations ranging from 30 to 76 m (100-250 feet) on primarily north- to northwest-facing slopes in narrow ravines. It has developed on very deep, moderately well-drained silt loam in the Hudson series (NRCS 2004); the underlying bedrock is sandstone and shale in the Canajoharie Formation. Adjacent communities include Northeastern Modified Successional Forest (CEGL006599), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), White Pine - Oak Forest (CEGL006293), Hemlock - Beech - Oak Forest (CEGL006088), Semi-rich Northern Hardwood Forest (CEGL006211), Northeastern Old Field (CEGL006107), and Mixed Forb Marsh (CEGL006446).

Vegetation Description: The nearly closed tree canopy of this association is dominated and characterized by *Tsuga canadensis* (eastern hemlock) and is overtopped by an emergent tree layer containing scattered *Pinus strobus* (eastern white pine). Other canopy species include *Quercus rubra* (northern red oak), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Acer saccharum* (sugar maple), *Betula lenta* (sweet birch), *Fagus grandifolia* (American beech), *Acer rubrum* (red maple), *Carya ovata* (shagbark hickory), and *Prunus serotina* (black cherry). Canopy trees are 25-30 m tall and have 80-85% cover; subcanopy trees reach 15 m in height with 45-50% cover. *Tsuga canadensis* (eastern hemlock) is dominant in the subcanopy and is associated with other canopy species as well as *Amelanchier arborea* (common serviceberry). The sparse tall-shrub layer (5-10% cover) is similar in composition to the subcanopy layer. Short shrubs are also sparse and consist of seedlings of the canopy and subcanopy species with scattered *Hamamelis virginiana* (American witchhazel) and *Viburnum acerifolium* (mapleleaf viburnum). Herbaceous cover is sparse (5-10% cover) and consists of scattered *Eurybia divaricata* (white wood aster), *Polystichum acrostichoides* (Christmas fern), *Dryopteris intermedia* (intermediate woodfern), *Glechoma hederacea* (ground ivy), *Arisaema triphyllum* (Jack in the pulpit), *Osmunda claytoniana* (interrupted fern), *Athyrium filix-femina* (common ladyfern), *Carex blanda* (eastern woodland sedge), *Monotropa hypopithys* (pinesap), *Monotropa uniflora* (Indianpipe), *Solidago caesia* (wreath goldenrod), and *Polygonatum pubescens* (hairy Solomon's seal).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Needle-leaved tree	*Tsuga canadensis* (eastern hemlock)

Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Shrub/sapling (tall & short)	Needle-leaved shrub	*Tsuga canadensis* (eastern hemlock)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech)
Herb (field)	Forb	*Eurybia divaricata* (white wood aster), *Glechoma hederacea* (ground ivy)
Herb (field)	Fern or fern ally	*Dryopteris intermedia* (intermediate woodfern), *Polystichum acrostichoides* (Christmas fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Dryopteris intermedia* (intermediate woodfern), *Eurybia divaricata* (white wood aster), *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Polystichum acrostichoides* (Christmas fern), *Tsuga canadensis* (eastern hemlock)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Hemlock-northern hardwood forest	Edinger et al. 2002

Local Range: This association occurs in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.33, SARA.185

Accuracy Assessment Observations: SARA.70 (AA), SARA.74 (AA), SARA.101 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Pinus strobus - Tsuga canadensis* Forest Alliance (A.127)
Alliance (English name)*	Eastern White Pine - Eastern Hemlock Forest Alliance
Association	*Pinus strobus - Tsuga canadensis* Lower New England / Northern Piedmont Forest
Association (English name)	Eastern White Pine - Eastern Hemlock Lower New England / Northern Piedmont Forest
Ecological System(s)	Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This dry-mesic coniferous forest of usually sloping (moderately to steeply) sites is dominated by *Pinus strobus* (eastern white pine) and/or *Tsuga canadensis* (eastern hemlock). It can occur in somewhat sheltered ravines where *Tsuga canadensis* (eastern hemlock) is nearly monotypic in all layers. Other frequent tree species depend on geography and can include *Betula papyrifera* (paper birch), *Quercus rubra* (northern red oak), and *Acer rubrum* (red maple), with *Pinus rigida* (pitch pine), *Prunus serotina* (black cherry), *Quercus velutina* (black oak), *Carya alba* (mockernut hickory), *Betula lenta* (sweet birch), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Betula alleghaniensis* (yellow birch), and *Betula populifolia* (gray birch) occurring less frequently. Although frequent, deciduous tree species generally occur with low abundance. Canopy cover is typically 80-90%. The subcanopy is often sparse but may extend up to 40% cover. *Acer pensylvanicum* (striped maple) is a common, though rarely abundant, small tree. Shrubs are absent or sparse but when present may include *Hamamelis virginiana* (American witchhazel), *Kalmia latifolia* (mountain laurel), *Rhododendron maximum* (great laurel), *Vaccinium angustifolium* (lowbush blueberry), and *Viburnum acerifolium* (mapleleaf viburnum). The herbaceous layer is generally not well-developed nor diverse and is generally characterized by *Gaultheria procumbens* (eastern teaberry), *Medeola virginiana* (Indian cucumber), *Polystichum acrostichoides* (Christmas fern), and *Thelypteris noveboracensis* (New York fern). Other herbaceous associates often include *Aralia nudicaulis* (wild sarsaparilla), *Uvularia sessilifolia* (sessileleaf bellwort), *Mitchella repens* (partridgeberry), *Trientalis borealis* (starflower), *Monotropa uniflora* (Indianpipe), *Dryopteris intermedia* (intermediate woodfern), *Dryopteris marginalis* (marginal woodfern), *Dryopteris carthusiana* (spinulose woodfern), *Polypodium virginianum* (rock polypody), and *Maianthemum canadense* (Canada mayflower). *Deschampsia flexuosa* (wavy hairgrass) and other grasses may be present in small openings and gaps. Nonvascular plants tend to be sparse but can include *Leucobryum albidum* (leucobryum moss) and *Polytrichum* (polytrichum moss) and *Dicranum* (dicranum moss) species. Soils are moderately to extremely well-drained (dry-mesic to mesic) loamy sands and sandy loams, often sandy, stony or bouldery. The major natural disturbance in this forest type is generally single-tree blowdowns.

Environmental Description: This dry-mesic coniferous forest is usually found on sloping (moderately to steeply) sites or in sheltered ravines. Soils are moderately to extremely well-drained (dry-mesic to mesic), loamy sands and sandy loams, often sandy, stony, or bouldery.

Vegetation Description: This coniferous forest type is dominated by *Pinus strobus* (eastern white pine) and/or *Tsuga canadensis* (eastern hemlock). Other frequent tree species depend on geography and can include *Betula papyrifera* (paper birch), *Quercus rubra* (northern red oak), and *Acer rubrum* (red maple), with *Pinus rigida* (pitch pine), *Prunus serotina* (black cherry), *Quercus velutina* (black oak), *Carya alba* (mockernut hickory), *Betula lenta* (sweet birch), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Betula alleghaniensis* (yellow birch), and *Betula populifolia* (gray birch) occurring less frequently. Although frequent, deciduous tree species generally occur with low abundance. Canopy cover is typically 80-90%. The subcanopy is often sparse but may extend up to 40% cover. *Acer pensylvanicum* (striped maple) is a common, though rarely abundant, small tree.

Shrubs are absent or sparse but when present may include *Hamamelis virginiana* (American witchhazel), *Kalmia latifolia* (mountain laurel), *Rhododendron maximum* (great laurel), *Vaccinium angustifolium* (lowbush blueberry), and *Viburnum acerifolium* (mapleleaf viburnum). The herbaceous layer is generally not well-developed nor diverse and is generally characterized by *Gaultheria procumbens* (eastern teaberry), *Medeola virginiana* (Indian cucumber), *Polystichum acrostichoides* (Christmas fern), and *Thelypteris noveboracensis* (New York fern). Other herbaceous associates often include *Aralia nudicaulis* (wild sarsaparilla), *Uvularia sessilifolia* (sessileleaf bellwort), *Mitchella repens* (partridgeberry), *Trientalis borealis* (starflower), *Monotropa uniflora* (Indianpipe), *Dryopteris intermedia* (intermediate woodfern), *Dryopteris marginalis* (marginal woodfern), *Dryopteris carthusiana* (spinulose woodfern), *Polypodium virginianum* (rock polypody), and *Maianthemum canadense* (Canada mayflower). *Deschampsia flexuosa* (wavy hairgrass) and other grasses may be present in small openings and gaps. Nonvascular plants tend to be sparse but can include *Leucobryum albidum* (leucobryum moss) and *Polytrichum* (polytrichum moss) and *Dicranum* (dicranum moss) species.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine), *Tsuga canadensis* (eastern hemlock)
Tall shrub/sapling	Broad-leaved decid. shrub	*Hamamelis virginiana* (American witchhazel)
Herb (field)	Fern or fern ally	*Polystichum acrostichoides* (Christmas fern), *Thelypteris noveboracensis* (New York fern)

Characteristic Species: *Acer pensylvanicum* (striped maple), *Gaultheria procumbens* (eastern teaberry), *Medeola virginiana* (Indian cucumber), *Pinus strobus* (eastern white pine), *Polystichum acrostichoides* (Christmas fern), *Thelypteris noveboracensis* (New York fern), *Tsuga canadensis* (eastern hemlock)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association occurs in the northeastern United States and possibly adjacent Canada.

States/Provinces: CT, MA, ME, NH, NJ, NY, PA, QC?, RI, VT

Federal Lands: NPS (Delaware Water Gap, Saint-Gaudens, Saratoga); USFWS (Assabet River, Great Meadows, Oxbow)

CONSERVATION STATUS

Rank: G5 (22-Mar-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This association is differentiated from *Pinus strobus - Tsuga canadensis - Picea rubens* Forest (CEGL006324) by its lack of *Picea rubens* (red spruce).

Similar Associations:

Pinus strobus - Tsuga canadensis - Picea rubens Forest (CEGL006324)

Pinus strobus - Tsuga canadensis / Acer pensylvanicum / Polystichum acrostichoides Forest (CEGL006019)

Pinus strobus - Tsuga canadensis Great Lakes Forest (CEGL002590)

Related Concepts:

CNE dry transitional forest on sandy / gravelly soils (Rawinski 1984) ?

CNE mesic conifer [transition] forest on acidic bedrock/till (Rawinski 1984) B

Eastern Hemlock: 23 (Eyre 1980) B

Hemlock Forest (Thompson 1996) B

White Pine - Hemlock: 22 (Eyre 1980) B

SOURCES

Description Authors: S.L. Neid, mod. S.C. Gawler

References: Brown et al. 1982a, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1999, Eyre 1980, Fike 1999, Gawler 2002, Gordon 1937a, Hough 1943, Hough and Forbes 1943, MENHP 1991, Metzler and Barrett 2001, NAP pers. comm. 1998, NRCS 2004, Rawinski 1984, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-15. White Pine - Hemlock Dry-Mesic Forest in the Saratoga Battlefield Unit (plot SARA.33, NYNHP L1, photo no. 198). 7/31/2003. NAD 1983 / UTM easting 612883, northing 4762349.

Local Name: White Pine - Oak Forest (CEGL006293)

SYNONYMS

USNVC English Name:	**Eastern White Pine - (Northern Red Oak, Black Oak) - American Beech Forest**
USNVC Scientific Name:	***Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia* Forest**
USNVC Identifier:	**CEGL006293**

LOCAL INFORMATION

Environmental Description: This evergreen-deciduous forest occurs at elevations between 40 and 122 m (130-400 feet) on gentle mid to lower slopes as well as on protected ridges. It has developed on shallow to very deep, poorly drained to somewhat excessively drained silt loam, channery silt loam, and mucky silty clay loam soils in the Bernardston, Bernardston-Manlius-Nassau complex, Sun, Mosherville, Pittstown, Hudson, Manlius-Nassau complex, Oakville, Rhinebeck, and Madalin series (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. It is adjacent to cropland, deciduous forests [Early-Successional Woodland/Forest (CEGL006303), Northeastern Oak - Red Maple Successional Forest (CEGL006506), Northeastern Dry Oak - Hickory Forest (CEGL006336), Dry, Rich Oak - Hickory Forest (CEGL006301), Northern Red Oak - Northern Hardwood Forest (CEGL006173), Semi-rich Northern Hardwood Forest (CEGL006211), Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)], and evergreen forests [White Pine Successional Forest (CEGL007944), White Pine - Hemlock Dry-Mesic Forest (CEGL006328), Hemlock - Northern Hardwood Forest (CEGL006109), Hemlock - Beech - Oak Forest (CEGL006088), White Pine Plantation (CEGL007178)].

Vegetation Description: This forest association is characterized by a canopy dominated by species of *Pinus* (pine) and *Quercus* (oak).The tree canopy (between 25 and 30 m tall) has greater than 75% cover and is dominated by *Pinus strobus* (eastern white pine) and *Quercus rubra* (northern red oak) with *Fagus grandifolia* (American beech), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Betula lenta* (sweet birch), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), *Quercus velutina* (black oak), *Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam), *Carya ovata* (shagbark hickory), and *Populus grandidentata* (bigtooth aspen) as associates. The subcanopy is between 10 and 15 m tall with 40 to 45% cover. *Ostrya virginiana* (hophornbeam) and *Fagus grandifolia* (American beech) are dominant with many of the canopy species listed above as well as *Tsuga canadensis* (eastern hemlock) and *Amelanchier arborea* (common serviceberry). The tall-shrub layer is fairly sparse (10% cover) and contains saplings of the canopy and subcanopy species with *Hamamelis virginiana* (American witchhazel), *Carpinus caroliniana* (American hornbeam), *Prunus virginiana* (chokecherry), and *Prunus serotina* (black cherry). Short shrubs are similarly sparse with between 10 and 15% cover; compositionally, they are similar to the tall-shrub layer with *Corylus americana* (American hazelnut), *Viburnum acerifolium* (mapleleaf viburnum), *Cornus*

rugosa (roundleaf dogwood), *Prunus americana* (American plum), and *Lonicera tatarica* (Tatarian honeysuckle). Scattered vines include *Parthenocissus quinquefolia* (Virginia creeper) and *Vitis aestivalis* (summer grape). Herbaceous cover is nearly 30% and is dominated by *Carex pensylvanica* (Pennsylvania sedge). Additional species include a number of ferns, such as *Onoclea sensibilis* (sensitive fern), *Polystichum acrostichoides* (Christmas fern), *Adiantum pedatum* (northern maidenhair), *Athyrium filix-femina* (common ladyfern), and *Dryopteris intermedia* (intermediate woodfern), as well as *Amphicarpaea bracteata* (American hogpeanut), *Podophyllum peltatum* (mayapple), *Arisaema triphyllum* (Jack in the pulpit), *Maianthemum canadense* (Canada mayflower), *Aralia nudicaulis* (wild sarsaparilla), *Eurybia divaricata* (white wood aster), *Carex blanda* (eastern woodland sedge), *Mitchella repens* (partridgeberry), *Maianthemum racemosum* (feathery false lily of the valley), *Monotropa uniflora* (Indianpipe), *Trientalis borealis* (starflower), *Epifagus virginiana* (beechdrops), and *Lysimachia quadrifolia* (whorled yellow loosestrife).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech), *Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fagus grandifolia* (American beech)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Hamamelis virginiana* (American witchhazel)
Short shrub/sapling	Broad-leaved deciduous shrub	*Corylus americana* (American hazelnut), *Ostrya virginiana* (hophornbeam)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)

Characteristic Species: *Acer saccharum* (sugar maple), *Amphicarpaea bracteata* (American hogpeanut), *Betula lenta* (sweet birch), *Carex pensylvanica* (Pennsylvania sedge), *Fagus grandifolia* (American beech), *Ostrya virginiana* (hophornbeam), *Pinus strobus* (eastern white pine), *Quercus alba* (white oak), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Appalachian oak-pine forest	Edinger et al. 2002

Local Range: This common, widespread community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.

Classification Comments: Mixed forests codominated by *Pinus strobus* (eastern white pine) and *Quercus rubra* (northern red oak) that lack significant cover of successional species are classified as

this association (CEGL006293). *Pinus strobus* (eastern white pine)-dominated successional forests are classified as White Pine Successional Forest (CEGL007944), or in cases where *Pinus strobus* (eastern white pine) is a minor component, it was classified as Northeastern Oak - Red Maple Successional Forest (CEGL006506).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.94, SARA.132, SARA.139, SARA.150, SARA.154

Accuracy Assessment Observations: SARA.21 (AA), SARA.46 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Pinus strobus - Quercus (alba, rubra, velutina)* Forest Alliance (A.401)
Alliance (English name)*	Eastern White Pine - (White Oak, Northern Red Oak, Black Oak) Forest Alliance
Association	*Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia* Forest
Association (English name)	Eastern White Pine - (Northern Red Oak, Black Oak) - American Beech Forest
Ecological System(s)	Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES201.563) Northeastern Interior Dry-Mesic Oak Forest (CES202.592) Central Appalachian Dry Oak-Pine Forest (CES202.591)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This mixed white pine - oak forest of the northeastern U.S. occurs on dry-mesic to mesic, acidic, nutrient-poor, sandy loam to sandy soils. In the northern glaciated portion of the range, the forest occurs on outwash plains or moraines, as well as along mid and lower slopes and within protected ravines, and on protected ridges or upper slopes of shale, sandstone or other sedimentary rock, occasionally underlain by metamorphic or igneous rock. Along the unglaciated plateau, this community occurs on rolling topography underlain by sandstone. It occurs at elevations below 915 m (3000 feet) throughout the range. The tree canopy is dominated by a mixture of *Pinus strobus* (eastern white pine) and oaks, including *Quercus velutina* (black oak), *Quercus rubra* (northern red oak), *Quercus alba* (white oak), *Quercus prinus* (chestnut oak) (usually in minor amounts), and primarily in the southern portions of the range, *Quercus coccinea* (scarlet oak). Oak species drop out at the northern extreme of the type's range, leaving only *Quercus rubra* (northern red oak). *Fagus grandifolia* (American beech) is characteristic over much of the range of this type but is absent in some areas. Other less frequent canopy associates may include *Acer rubrum* (red maple), *Betula lenta* (sweet birch), *Carya alba* (mockernut hickory), *Pinus rigida* (pitch pine),

Populus tremuloides (quaking aspen), *Fraxinus americana* (white ash), *Ulmus americana* (American elm), *Tsuga canadensis* (eastern hemlock), and at the northern range limit may include *Betula papyrifera* (paper birch) and *Populus grandidentata* (bigtooth aspen). The variable subcanopy may include *Hamamelis virginiana* (American witchhazel) or *Prunus serotina* (black cherry); other species such as *Carpinus caroliniana* (American hornbeam), *Cornus florida* (flowering dogwood), and *Nyssa sylvatica* (blackgum) may be present in the central and southern portions of the range. It has a sparse to well-developed, generally ericaceous shrub layer. The herb layer ranges from sparse to moderately dense cover. In disturbed settings, *Rhamnus cathartica* (common buckthorn) may be an abundant shrub. The bryophyte layer is not well-documented. This association is differentiated from mixed oak-pine forests to the south by *Fagus grandifolia* (American beech) and the absence of southern-ranging species *Liriodendron tulipifera* (tuliptree), *Galax urceolata* (beetleweed), *Trillium catesbaei* (bashful wakerobin), *Halesia tetraptera* (mountain silverbell), and others. The absence of *Ilex glabra* (inkberry) and the unimportance of *Quercus alba* (white oak) differentiate this type from a closely related association of northeastern coastal areas, *Pinus strobus - Quercus alba / Ilex glabra* Forest (CEGL006382). Earlier successional versions in New England have less pine (usually) and more *Betula* (birch) spp. and *Acer rubrum* (red maple) and are separated as *Quercus rubra - Acer rubrum - Betula* spp. - *Pinus strobus* (eastern white pine) Forest (CEGL006506).

Environmental Description: This mixed white pine - oak forest occurs on dry-mesic to mesic, acidic, nutrient-poor, sandy loam to sandy soils along mid and lower slopes, and along the unglaciated plateau on rolling topography underlain by sandstone. In the northern glaciated portion of the range, the forest occurs on outwash plains or moraines, as well as along mid and lower slopes and within protected ravines, and on protected ridges of shale, sandstone, or other sedimentary rock, occasionally underlain by metamorphic or igneous rock. Along the unglaciated plateau, this community occurs on rolling topography underlain by sandstone. It occurs at elevations below 915 m (3000 feet) throughout the range.

Vegetation Description: The tree canopy is dominated by a mixture of *Pinus strobus* (eastern white pine) and oaks, including *Quercus velutina* (black oak), *Quercus rubra* (northern red oak), *Quercus alba* (white oak), *Quercus prinus* (chestnut oak) (usually in minor amounts), and primarily in the southern portions of the range, *Quercus coccinea* (scarlet oak). Oak species drop out at the northern extreme of the type's range, leaving only *Quercus rubra* (northern red oak). *Fagus grandifolia* (American beech) is characteristic but not always present. Other less frequent canopy associates may include *Acer rubrum* (red maple), *Betula lenta* (sweet birch), *Carya alba* (mockernut hickory), *Populus tremuloides* (quaking aspen), *Fraxinus americana* (white ash), *Ulmus americana* (American elm), *Tsuga canadensis* (eastern hemlock), and at the northern range limit may include *Betula papyrifera* (paper birch) and *Populus grandidentata* (bigtooth aspen). The variable subcanopy may include *Hamamelis virginiana* (American witchhazel) or *Prunus serotina* (black cherry); other species such as *Carpinus caroliniana* (American hornbeam), *Cornus florida* (flowering dogwood), and *Nyssa sylvatica* (blackgum) may be present in the central and southern portions of the range. The sparse to well-developed, generally ericaceous shrub layer includes *Gaylussacia* (huckleberry) spp. (usually *Gaylussacia baccata), Kalmia latifolia* (mountain laurel), *Vaccinium* (blueberry) spp.

(typically *Vaccinium pallidum* (Blue Ridge blueberry) and/or *Vaccinium angustifolium)*, and sometimes *Kalmia angustifolia* (sheep laurel), as well as *Rubus* (blackberry) spp., *Corylus americana* (American hazelnut), *Rhododendron periclymenoides* (pink azalea), *Gaultheria procumbens* (eastern teaberry), *Sassafras albidum* (sassafras), and *Viburnum prunifolium* (blackhaw). The herb layer ranges from sparse to moderately dense cover, with species including *Aralia nudicaulis* (wild sarsaparilla), *Ageratina altissima* (white snakeroot), *Amphicarpaea bracteata* (American hogpeanut), *Brachyelytrum erectum* (bearded shorthusk), *Carex communis* (fibrousroot sedge), *Carex woodii* (pretty sedge), *Carex pensylvanica* (Pennsylvania sedge), *Carex lucorum* (Blue Ridge sedge), *Carex debilis* (white edge sedge), *Melampyrum lineare* (narrowleaf cowwheat), *Pteridium aquilinum* (western brackenfern), *Trientalis borealis* (starflower), *Gaultheria procumbens* (eastern teaberry), *Chimaphila maculata* (striped prince's pine), *Desmodium nudiflorum* (nakedflower ticktrefoil), *Galium latifolium* (purple bedstraw), *Goodyera pubescens* (downy rattlesnake plantain), *Hieracium venosum* (rattlesnakeweed), *Houstonia purpurea* (Venus' pride), *Maianthemum racemosum* (feathery false lily of the valley), *Maianthemum canadense* (Canada mayflower), *Medeola virginiana* (Indian cucumber), *Mitchella repens* (partridgeberry), *Monotropa uniflora* (Indianpipe), *Poa cuspidata* (early bluegrass), *Polygonatum biflorum* (smooth Solomon's seal), *Polystichum acrostichoides* (Christmas fern), and/or *Viola hastata* (halberdleaf yellow violet). In disturbed settings, *Rhamnus cathartica* (common buckthorn) may be an abundant shrub. The bryophyte layer is not well-documented but supports *Leucobryum glaucum* (leucobryum moss) and *Polytrichum commune* (polytrichum moss) in occurrences in the northern portion of the range (Acadia National Park).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Quercus alba* (white oak), *Quercus prinus* (chestnut oak), *Quercus rubra* (northern red oak), *Quercus velutina* (black oak)
Tree subcanopy	Broad-leaved deciduous tree	*Prunus serotina* (black cherry)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Hamamelis virginiana* (American witchhazel)
Short shrub/sapling	Broad-leaved evergreen shrub	*Kalmia latifolia* (mountain laurel)
Herb (field)	Forb	*Aralia nudicaulis* (wild sarsaparilla), *Maianthemum canadense* (Canada mayflower), *Trientalis borealis* (starflower)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)

Characteristic Species: *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This community occurs in New England south and west to Pennsylvania and West Virginia and possibly New Jersey. Total acreage for all subsections is approximately 230,000 square km.

States/Provinces: MA, ME, NH, NJ?, NY, PA, RI, VT:S3, WV

Federal Lands: NPS (Acadia, Delaware Water Gap, Minute Man, Saratoga, Upper Delaware); USFS (Finger Lakes); USFWS (Assabet River, Great Meadows, Oxbow)

CONSERVATION STATUS

Rank: G5 (31-Jan-2007)

Reasons: This vegetation occurs as large patches of the matrix forest type and ranges across most northeastern states. Pristine or old-growth examples are few, but in general this forest type has recovered to mid- to late-successional stages following large-scale clearing by European settlers.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: In the northern part of this type's range, it can be similar to *Tsuga canadensis - Fagus grandifolia - Quercus rubra* Forest (CEGL006088), which is distinguished by having *Tsuga canadensis* (eastern hemlock) as the principal canopy conifer. However, examples of both types may have *Pinus strobus* (eastern white pine) and *Tsuga canadensis* (eastern hemlock) present. In the southern part of this type's range, drier expressions overlap conceptually with *Pinus strobus - Quercus alba - Quercus prinus / Vaccinium stamineum* Forest (CEGL008539) to the south, and the overlap between those two needs clarification.

Similar Associations:

Pinus strobus - (Pinus resinosa) - Quercus rubra Forest (CEGL002480)
Pinus strobus - Quercus alba - Quercus prinus / Vaccinium stamineum Forest (CEGL008539)
Pinus strobus - Quercus alba / Ilex glabra Forest (CEGL006382)
Quercus (alba, rubra, velutina) / Cornus florida / Viburnum acerifolium Forest (CEGL006336)--has less pine, more hickory, and little or no beech, but can intergrade to this type.
Quercus rubra - Acer rubrum - Betula spp. *- Pinus strobus* Forest (CEGL006506)
Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium Forest (CEGL006173)
Tsuga canadensis - Fagus grandifolia - Quercus rubra Forest (CEGL006088)

Related Concepts:

Eastern White Pine: 21 (Eyre 1980) B
Mesic Pine-Oak Forest (Thompson 1996) ?
Pine-Oak-Heath Sandplain Forest (Thompson 1996) ?
SNE dry central hardwood forest on acidic bedrock or till (Rawinski 1984) B
SNE dry oak/pine forests on acidic bedrock or till (Rawinski 1984) B
SNE mesic oak/pine forest on sandy/gravelly soil (Rawinski 1984) B
White Pine - Northern Red Oak - Red Maple: 20 (Eyre 1980) B
White pine-oak-beech dry forest (large patch to matrix) (CAP pers. comm. 1998) ?

SOURCES

Description Authors: L.A. Sneddon, mod. E. Largay and S.C. Gawler

References: Breden et al. 2001, CAP pers. comm. 1998, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1993, Eyre 1980, Fike 1999, Gawler 2002, Kuchler 1956, Lundgren 2001, Moore and Taylor 1927, NRCS 2004, Rawinski 1984, Sperduto 2000a, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Jenkins 1992, Thompson and Sorenson 2000



Figure F-16. White Pine - Oak Forest in the Saratoga Battlefield Unit (plot SARA.150, NYNHP X7, photo no. 667). 9/21/2004. NAD 1983 / UTM easting 611287, northing 4761252.

Local Name: Northern Hardwood - White Pine Forest (CEGL005005)

SYNONYMS

USNVC English Name: Sugar Maple - Eastern White Pine / Striped Maple Forest
USNVC Scientific Name: *Acer saccharum - Pinus strobus / Acer pensylvanicum* Forest
USNVC Identifier: CEGL005005

LOCAL INFORMATION

Environmental Description: This mixed forest occurs on rolling to moderately steep slopes from 64 to 95 m (210-310 feet) in elevation. Soil is very deep, moderately well-drained to well-drained silt loam in the Hudson and Bernardston series (NRCS 2004), and the underlying bedrock is shale and sandstone in the Canajoharie Formation. The single patch of this forest at Saratoga is largely surrounded by White Pine Successional Forest (CEGL007944).

Vegetation Description: The nearly closed canopy (80-85% cover) of this association is dominated by *Acer saccharum* (sugar maple) with lesser amounts of *Pinus strobus* (eastern white pine) and associates that include *Ostrya virginiana* (hophornbeam), *Quercus alba* (white oak), *Prunus serotina* (black cherry), and *Fraxinus americana* (white ash). Canopy species reach 25-30 m tall, with subcanopy trees reaching 15-20 m in height. The subcanopy layer has 50-55% cover and is dominated by *Ostrya virginiana* (hophornbeam) with *Carya glabra* (pignut hickory) and other associates that also appear in the canopy layer. The sparse (less than 10% cover) tall-shrub layer is dominated by *Rhamnus cathartica* (common buckthorn) with *Rubus occidentalis* (black raspberry), *Prunus serotina* (black cherry), and saplings of the canopy species. Short shrubs are much more abundant, with 35% cover. In addition to seedlings of the canopy and tall-shrub species, low shrubs are *Rubus flagellaris* (northern dewberry), *Lonicera tatarica* (Tatarian honeysuckle), *Amelanchier* (serviceberry) sp., *Prunus virginiana* (chokecherry), and *Viburnum acerifolium* (mapleleaf viburnum). The vine *Parthenocissus quinquefolia* (Virginia creeper) occurs at low abundance. Herbaceous species have 60% cover and include *Carex pensylvanica* (Pennsylvania sedge), *Onoclea sensibilis* (sensitive fern), *Athyrium filix-femina* (common ladyfern), *Leersia virginica* (whitegrass), *Pilea pumila* (Canadian clearweed), *Osmunda claytoniana* (interrupted fern), *Fragaria virginiana* (Virginia strawberry), *Solidago gigantea* (giant goldenrod), *Dryopteris intermedia* (intermediate woodfern), *Alliaria petiolata* (garlic mustard), *Hackelia virginiana* (beggarslice), *Juncus tenuis* (poverty rush), and *Circaea lutetiana* (broadleaf enchanter's nightshade).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Needle-leaved tree	*Pinus strobus* (eastern white pine)
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple)
Tree subcanopy	Broad-leaved deciduous tree	*Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)

Short shrub/sapling	Broad-leaved deciduous shrub	*Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Rubus flagellaris* (northern dewberry), *Rubus occidentalis* (black raspberry)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Athyrium filix-femina* (common ladyfern), *Carex pensylvanica* (Pennsylvania sedge), *Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Onoclea sensibilis* (sensitive fern), *Ostrya virginiana* (hophornbeam), *Pinus strobus* (eastern white pine), *Prunus serotina* (black cherry), *Rubus occidentalis* (black raspberry)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Pine-northern hardwood forest	Edinger et al. 2002

Local Range: The association is located in the headwaters of Mill Creek in the Battlefield Unit at Saratoga National Historical Park.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: None
Accuracy Assessment Observations: SARA.60 (AA), SARA.112 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Pinus strobus - Acer saccharum* Forest Alliance (A.3012)
Alliance (English name)*	Eastern White Pine - Sugar Maple Forest Alliance
Association	*Acer saccharum - Pinus strobus / Acer pensylvanicum* Forest
Association (English name)	Sugar Maple - Eastern White Pine / Striped Maple Forest
Ecological System(s)	Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES201.563) Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This dry white pine - northern hardwood forest occurs widely throughout the upper midwestern and northeastern United States and eastern Canada. The typical environmental setting is well-drained, acidic, sandy or gravelly soil over glacial till, in general a less mesic setting than northern hardwoods lacking white pine. Stands are characterized by a closed canopy, sometimes with supercanopy pine, patchy (but overall fairly sparse) shrubs, and relatively sparse herb and bryoid strata. Canopy dominants are the northern hardwood species *Acer saccharum* (sugar maple), *Betula alleghaniensis* (yellow birch), and in the Northeast *Fagus grandifolia* (American beech), with *Pinus strobus* (eastern white pine), the pine often occurring as a supercanopy. Minor canopy associates may include *Tsuga canadensis* (eastern hemlock) and *Quercus rubra* (northern red oak). In the Northeast at the northern edge of the range, *Abies balsamea* (balsam fir), *Picea rubens* (red spruce) and *Thuja occidentalis* (arborvitae) may also occur sparingly. The subcanopy is dominated by *Acer pensylvanicum* (striped maple). The herbaceous layer is characterized by *Trientalis borealis* (starflower), *Maianthemum canadense* (Canada mayflower), *Pteridium aquilinum* (western brackenfern), *Oryzopsis asperifolia* (roughleaf ricegrass), intermixed with the dwarf-shrubs *Gaultheria procumbens* (eastern teaberry), *Vaccinium angustifolium* (lowbush blueberry) and *Gaylussacia baccata* (black huckleberry). Bryophytes include *Polytrichum commune* (polytrichum moss), *Pleurozium schreberi* (Schreber's big red stem moss), *Bazzania trilobata*, or *Hypnum imponens* (hypnum moss). Distribution in Michigan needs further checking.

Environmental Description: In the northern Appalachian region, stands occur on sandy-gravelly soils, eskers in the Adirondacks, and also in a narrow band along lakeshores (Northern Appalachian Ecoregional Planning Team pers. comm. 1998).

Vegetation Description: Stands are dominated primarily by *Acer saccharum* (sugar maple) with a *Pinus strobus* (eastern white pine) supercanopy (pine may be less than 25%). There may be some *Tsuga canadensis* (eastern hemlock). Other northern hardwood tree species may also be present. The understory may contain *Oryzopsis asperifolia* (roughleaf ricegrass) and *Pteridium aquilinum* (western brackenfern) in addition to standard northern hardwood understory.

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This type is found widely throughout the upper midwestern and northeastern United States and eastern Canada, ranging from Michigan and Ontario east to Pennsylvania and north to Maine.

States/Provinces: MA?, ME, MI, NH, NY, ON:S5, PA, VT

Federal Lands: NPS (Acadia, Saratoga); USFS (Hiawatha)

CONSERVATION STATUS

Rank: GNR (3-Oct-1996)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This type is difficult to sort out, and stands with only a scattered supercanopy of *Pinus strobus* (eastern white pine) (less than 25% cover) are floristically very similar to northern hardwoods types [see *Acer saccharum - Betula alleghaniensis - (Tilia americana*) Forest (CEGL002457), *Acer saccharum - Fagus grandifolia - Betula* spp. / *Maianthemum canadense* (Canada mayflower) Forest (CEGL005004), and *Acer saccharum - Betula alleghaniensis - Fagus grandifolia / Viburnum lantanoides* Forest (CEGL006252)]. Further review of this issue is needed. Note that the Ontario type to which this type is crosswalked is a mixed evergreen-deciduous type, with white pine between 25% and 50% canopy cover. The importance of white pine in this association is considered to indicate relatively dry, nutrient-poor site conditions and includes mature stands in natural condition. White pine can also be a successional component of forests that regenerated after clearing, which complicates interpretation. However, this association theoretically comprises stands where white pine is "natural" and not present as a result of land-use history.

Similar Associations:

Acer saccharum - Betula alleghaniensis - (Tilia americana) Forest (CEGL002457)

Acer saccharum - Betula alleghaniensis - Fagus grandifolia / Viburnum lantanoides Forest (CEGL006252)

Acer saccharum - Fagus grandifolia - Betula spp. / *Maianthemum canadense* Forest (CEGL005004)

Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium Forest (CEGL006173)

Related Concepts:

Eastern White Pine: 21 (Eyre 1980) B

Mesic Northern Hardwood Forest (Beech-Birch-Maple Forest) (Thompson 1996) B

White pine-northern hardwood forest (NAP pers. comm. 1998) ?

SOURCES

Description Authors: L.A. Sneddon, M. Anderson, and K. Metzler

References: Eastern Ecology Working Group n.d., Eyre 1980, Fike 1999, Gawler 2002, Kuchler 1956, Moore and Taylor 1927, NAP pers. comm. 1998, NRCS 2004, Sperduto 2000a, Thompson 1996, Thompson and Sorenson 2000



Figure F-17. Northern Hardwood - White Pine Forest in the Saratoga Battlefield Unit (AA point SARA.112, NYNHP 213). 7/18/2006. NAD 1983 / UTM easting 611209, northing 4762660.

Local Name: Northern Red Oak - Northern Hardwood Forest (CEGL006173)

SYNONYMS

USNVC English Name:	**Northern Red Oak - Sugar Maple - American Beech / Mapleleaf Viburnum Forest**
USNVC Scientific Name:	***Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium* Forest**
USNVC Identifier:	**CEGL006173**

LOCAL INFORMATION

Environmental Description: This mesic, deciduous forest is found at Saratoga primarily on mid to upper gentle slopes with variable aspect that are between 61 and 140 m (200-460 feet_ in elevation. The substrate is somewhat moist, shallow to very deep, poorly drained to somewhat excessively drained soil composed of channery silt loam, loamy fine sand, and silt loam in the Manlius-Nassau complex, Claverack, Hudson, Bernardston, Sun, Pittstown, Bernardston-Manlius-Nassau complex, Nassau-Rock outcrop complex, Rhinebeck, and Oakville series (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. Most often, this community is surrounded by or adjacent to Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Old Field (CEGL006107), White Pine - Oak Forest (CEGL006293), and Semi-rich Northern Hardwood Forest (CEGL006211); additional adjacent communities include Southern New England Red Maple Seepage Swamp (CEGL006406), Northeastern Modified Successional Forest (CEGL006599), Northeastern Dry Oak - Hickory Forest (CEGL006336), and cropland.

Vegetation Description: This association is characterized by codominance of *Acer saccharum* (sugar maple) and *Quercus rubra* (northern red oak) in the nearly closed canopy layer with lesser amounts of *Fagus grandifolia* (American beech) and associates that include *Populus tremuloides* (quaking aspen), *Acer rubrum* (red maple), *Quercus alba* (white oak), *Quercus coccinea* (scarlet oak), *Betula lenta* (sweet birch), and *Tsuga canadensis* (eastern hemlock). Canopy trees extend over 25 m in height and have 80% cover; subcanopy trees extend to 15 m with 45% cover. In addition to the species listed above, subcanopy trees include *Ostrya virginiana* (hophornbeam), *Prunus serotina* (black cherry), *Carya ovata* (shagbark hickory), and *Fraxinus americana* (white ash). Tall shrubs are scattered, with 10% cover, and consist of *Hamamelis virginiana* (American witchhazel) with saplings of the dominant tree canopy species. Short shrubs are slightly more abundant (15-20% cover) and are dominated by root sprouts of *Fagus grandifolia* (American beech) with *Viburnum acerifolium* (mapleleaf viburnum), *Lonicera tatarica* (Tatarian honeysuckle), *Viburnum dentatum* (southern arrowwood), *Rubus idaeus* (American red raspberry), *Vaccinium angustifolium* (lowbush blueberry), *Vaccinium pallidum* (Blue Ridge blueberry), and seedlings of the canopy and subcanopy species. Vines are also present and scattered; the most abundant species are *Parthenocissus quinquefolia* (Virginia creeper) and *Vitis aestivalis* (summer grape). The herbaceous layer, with 20-25% cover, contains *Carex pensylvanica* (Pennsylvania sedge), *Osmunda claytoniana* (interrupted fern),

Polystichum acrostichoides (Christmas fern), *Dennstaedtia punctilobula* (eastern hayscented fern), *Eurybia divaricata* (white wood aster), *Athyrium filix-femina* (common ladyfern), *Onoclea sensibilis* (sensitive fern), *Arisaema triphyllum* (Jack in the pulpit), *Veronica officinalis* (common gypsyweed), *Alliaria petiolata* (garlic mustard), *Epifagus virginiana* (beechdrops), *Mitchella repens* (partridgeberry), *Monotropa uniflora* (Indianpipe), *Thelypteris noveboracensis* (New York fern), *Trientalis borealis* (starflower), *Uvularia sessilifolia* (sessileleaf bellwort), and *Adiantum pedatum* (northern maidenhair).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple)
Tree canopy	Broad-leaved deciduous tree	*Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fagus grandifolia* (American beech)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharum* (sugar maple), *Hamamelis virginiana* (American witchhazel)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)
Herb (field)	Fern or fern ally	*Dennstaedtia punctilobula* (eastern hayscented fern), *Osmunda claytoniana* (interrupted fern), *Polystichum acrostichoides* (Christmas fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Carex pensylvanica* (Pennsylvania sedge), *Fagus grandifolia* (American beech), *Hamamelis virginiana* (American witchhazel), *Ostrya virginiana* (hophornbeam), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Beech-maple mesic forest	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.93, SARA.118, SARA.179

Accuracy Assessment Observations: SARA.47 (AA), SARA.71 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Quercus rubra - (Acer saccharum)* Forest Alliance (A.251)
Alliance (English name)*	Northern Red Oak - (Sugar Maple) Forest Alliance
Association	*Quercus rubra - Acer saccharum - Fagus grandifolia / Viburnum acerifolium* Forest
Association (English name)	Northern Red Oak - Sugar Maple - American Beech / Mapleleaf Viburnum Forest
Ecological System(s)	Laurentian-Acadian Pine-Hemlock-Hardwood Forest (CES201.563) Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: Transitional between temperate and boreal regions, these mesic forests of oak and northern hardwoods, sometimes mixed with hemlock or pine, are distributed across the glaciated northeastern United States. They occur on slightly acidic, well-drained loamy and often rocky soils of intermediate fertility, most often positioned on midslopes and coves. Soil depth is often shallow, but some stands occur on deep tills. Most are at low to mid elevations, usually under 520 m (1700 feet), but in the southern portion of their distribution they may range up to 765 m (2500 feet). The deciduous-to-mixed canopy is mostly closed, and the lower layers are variable in extent. Tall shrubs are well-represented, although scattered, with occasional denser patches. Herbs are sparse and bryoids are nearly absent. Ericads and other dwarf-shrubs are also nearly absent, a characteristic that distinguishes this association from most other red oak forests in the Northeast. Canopy composition is a variable mixture of *Quercus rubra* (northern red oak) (usually at least 30% of the canopy), *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), and in some stands *Pinus strobus* (eastern white pine) or *Tsuga canadensis* (eastern hemlock). Conifers generally make up less than 20% of the canopy cover, and even in mixed stands the cover of deciduous trees exceeds that of conifers. Minor canopy associates include *Fraxinus americana* (white ash), *Tilia americana* (American basswood), *Betula lenta* (sweet birch), *Juglans cinerea* (butternut), and *Ulmus americana* (American elm). *Acer pensylvanicum* (striped maple) is common as a small tree; in the central and southern portions of the distribution, *Cornus florida* (flowering dogwood) and *Prunus serotina* (black cherry) are common small trees as well. *Corylus cornuta* (beaked hazelnut), *Viburnum acerifolium* (mapleleaf viburnum), and *Hamamelis virginiana* (American witchhazel) are standard shrubs, with *Kalmia latifolia* (mountain laurel) and *Lindera benzoin* (northern spicebush) occasional in all but the northern portions of the range. Typical species in the herb layer include *Gaultheria procumbens* (eastern teaberry), *Maianthemum canadense* (Canada mayflower), *Aralia nudicaulis* (wild sarsaparilla), *Trientalis borealis* (starflower), *Uvularia sessilifolia* (sessileleaf bellwort), *Medeola virginiana* (Indian cucumber), *Brachyelytrum erectum* (bearded shorthusk),

Dryopteris intermedia (intermediate woodfern), *Polystichum acrostichoides* (Christmas fern), *Dennstaedtia punctilobula* (eastern hayscented fern), *Pteridium aquilinum* (western brackenfern), and *Thelypteris noveboracensis* (New York fern). On more nutrient-rich soils, the herb layer may contain *Solidago caesia* (wreath goldenrod), *Caulophyllum thalictroides* (blue cohosh), *Dryopteris marginalis* (marginal woodfern), and *Eurybia divaricata* (white wood aster). This association is distinguished from northern hardwood forests by its greater amount of oak, from other oak forests by its greater prominence of northern hardwoods and lack of dwarf-shrub ericads, and from hemlock-hardwoods by the relatively low importance of hemlock.

Environmental Description: Transitional between temperate and boreal regions, these mesic forests of oak, beech, and maple are distributed across the glaciated northeastern United States. They occur on slightly acidic, well-drained loamy and often rocky soils of intermediate fertility, most often positioned on mid-slopes and coves. Soil depth is often shallow, but some occur on deep tills. Most are at low to mid elevations, usually under 1700 feet, but in the southern portion of their distribution they may range up to 2500 feet.

Vegetation Description: The deciduous-to-mixed canopy is mostly closed, and the lower layers are variable in extent. Tall shrubs are well represented, although scattered, with occasional denser patches. Herbs are sparse, and bryoids are nearly absent. Ericads and other dwarf-shrubs are also nearly absent, a characteristic that distinguishes this association from most other red oak forests in the Northeast. Canopy composition is a variable mixture of *Quercus rubra* (northern red oak) (usually at least 30% of the canopy), *Fagus grandifolia* (American beech), *Acer saccharum* (sugar maple), *Acer rubrum* (red maple), and, in some stands, *Pinus strobus* (eastern white pine) or *Tsuga canadensis* (eastern hemlock). In mixed stands, the cover of deciduous trees exceeds that of conifers. Minor canopy associates include *Fraxinus americana* (white ash), *Tilia americana* (American basswood), *Betula lenta* (sweet birch), *Juglans cinerea* (butternut), and *Ulmus americana* (American elm). *Acer pensylvanicum* (striped maple) is common as a small tree; in the central and southern portions of the distribution, *Cornus florida* (flowering dogwood) and *Prunus serotina* (black cherry) are common small trees as well. *Corylus cornuta* (beaked hazelnut), *Viburnum acerifolium* (mapleleaf viburnum), and *Hamamelis virginiana* (American witchhazel) are standard shrubs, with *Kalmia latifolia* (mountain laurel) and *Lindera benzoin* (northern spicebush) occasional in all but the northern portions of the range. Typical species in the herb layer include *Gaultheria procumbens* (eastern teaberry), *Maianthemum canadense* (Canada mayflower), *Aralia nudicaulis* (wild sarsaparilla), *Trientalis borealis* (starflower), *Uvularia sessilifolia* (sessileleaf bellwort), *Medeola virginiana* (Indian cucumber), *Brachyelytrum erectum* (bearded shorthusk), *Dryopteris intermedia* (intermediate woodfern), *Polystichum acrostichoides* (Christmas fern), *Dennstaedtia punctilobula* (eastern hayscented fern), *Pteridium aquilinum* (western brackenfern), and *Thelypteris noveboracensis* (New York fern). On more nutrient-rich soils, the herb layer may contain *Solidago caesia* (wreath goldenrod), *Caulophyllum thalictroides* (blue cohosh), and *Eurybia divaricata* (white wood aster).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer pensylvanicum* (striped maple), *Cornus florida* (flowering dogwood), *Prunus serotina* (black cherry)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Corylus cornuta* (beaked hazelnut), *Hamamelis virginiana* (American witchhazel), *Viburnum acerifolium* (mapleleaf viburnum)
Herb (field)	Forb	*Aralia nudicaulis* (wild sarsaparilla), *Trientalis borealis* (starflower)
Herb (field)	Fern or fern ally	*Dennstaedtia punctilobula* (eastern hayscented fern)

Characteristic Species: *Acer pensylvanicum* (striped maple), *Acer rubrum* (red maple), *Aralia nudicaulis* (wild sarsaparilla), *Cornus florida* (flowering dogwood), *Corylus cornuta* (beaked hazelnut), *Dennstaedtia punctilobula* (eastern hayscented fern), *Hamamelis virginiana* (American witchhazel), *Polystichum acrostichoides* (Christmas fern), *Prunus serotina* (black cherry), *Pteridium aquilinum* (western brackenfern), *Quercus rubra* (northern red oak), *Trientalis borealis* (starflower), *Viburnum acerifolium* (mapleleaf viburnum)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association occurs in New England and adjacent Canada and in New Jersey.
States/Provinces: MA, ME:S4, NB, NH, NJ, NY, PA, RI, VT:S4
Federal Lands: NPS (Marsh-Billings-Rockefeller, Minute Man, Saratoga); USFS (Finger Lakes)

CONSERVATION STATUS

Rank: G4G5 (7-Dec-2005)
Reasons: This association is well-distributed in the northeastern U.S. in its large-patch setting.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: Information not available.
Similar Associations:
Acer saccharum - Betula alleghaniensis - Fagus grandifolia / Viburnum lantanoides Forest (CEGL006252)
Acer saccharum - Betula alleghaniensis - Quercus rubra / Viburnum acerifolium Forest (CEGL006943)
Acer saccharum - Pinus strobus / Acer pensylvanicum Forest (CEGL005005)

Pinus strobus - Quercus (rubra, velutina) - Fagus grandifolia Forest (CEGL006293)
Quercus rubra - Acer rubrum - Betula spp. *- Pinus strobus* Forest (CEGL006506)
Quercus rubra - Acer saccharum - Tilia americana var. *heterophylla - Aesculus flava - (Cladrastis kentukea)* Forest (CEGL007698)
Quercus rubra - Acer saccharum Forest (CEGL002461)
Quercus rubra - Quercus alba - (Quercus velutina, Acer rubrum) / Viburnum acerifolium Forest (CEGL002462)
Tsuga canadensis - Betula alleghaniensis - Acer saccharum / Dryopteris intermedia Forest (CEGL006109)
Tsuga canadensis - Fagus grandifolia - Quercus rubra Forest (CEGL006088)

Related Concepts:

CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B
Mesic Red Oak-Northern Hardwood Forest (Thompson 1996) ?
Northern Red Oak: 55 (Eyre 1980) B

SOURCES

Description Authors: S.C. Gawler

References: Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Eyre 1980, Gawler 2002, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Sperduto 2000a, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-18. Northern Red Oak - Northern Hardwood Forest in the Saratoga Battlefield Unit (AA point SARA.47, NYNHP 96). 7/14/2006. NAD 1983 / UTM easting 611550, northing 4759508.

Local Name: Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046)

SYNONYMS

USNVC English Name:	**Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest**
USNVC Scientific Name:	***Acer saccharum* - *Quercus rubra / Hepatica nobilis* var. *obtusa* Forest**
USNVC Identifier:	**CEGL006046**

LOCAL INFORMATION

Environmental Description: This deciduous forest occurs at elevations that range from 30 to 70 m (100-230 feet) on west/southwest-facing slopes in narrow, steep ravines as well as on high, level hilltops. Stands have developed on soils that are very deep, moderately well-drained to poorly drained, and composed of silt loam, loamy fine sand, and loamy sand in the Hudson, Oakville, and Wareham series (NRCS 2004). The underlying bedrock is shale and sandstone in the Canajoharie Formation. Many examples of Eastern Woodland Vernal Pool (CEGL006453) are nested within the large patch of this community that occurs on the flat hilltop above the abandoned Champlain Canal. Adjacent natural communities include Bracken Grassland (CEGL005142), Little Bluestem Old Field (CEGL006333), White Pine Successional Forest (CEGL007944), Northeastern Modified Successional Forest (CEGL006599), White Pine - Oak Forest (CEGL006293), and Semi-rich Northern Hardwood Forest (CEGL006211).

Vegetation Description: The somewhat closed (70-75% cover) tree canopy of this association is dominated by *Quercus rubra* (northern red oak) with slightly lesser amounts of *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Quercus coccinea* (scarlet oak), *Fraxinus americana* (white ash), *Betula lenta* (sweet birch), *Populus tremuloides* (quaking aspen), *Pinus strobus* (eastern white pine), and scattered *Tilia americana* (American basswood), *Fagus grandifolia* (American beech), and *Prunus serotina* (black cherry). Canopy trees reach 25-30 m in height, and subcanopy trees are 15-20 m tall. The subcanopy is less dense (55% cover) and contains many of the species listed above in the canopy as well as *Ostrya virginiana* (hophornbeam), *Carpinus caroliniana* (American hornbeam), *Carya glabra* (pignut hickory), and *Amelanchier arborea* (common serviceberry). Tall and short shrubs have less than 20% cover and consist of saplings and seedlings of the canopy and subcanopy species. Additional short shrubs are *Rubus hispidus* (bristly dewberry), *Sassafras albidum* (sassafras), *Hamamelis virginiana* (American witchhazel), *Rhamnus cathartica* (common buckthorn), and *Lonicera tatarica* (Tatarian honeysuckle). *Parthenocissus quinquefolia* (Virginia creeper) is a somewhat common vine. Herbaceous cover is 65%; species include *Osmunda claytoniana* (interrupted fern), *Carex pensylvanica* (Pennsylvania sedge), *Amphicarpaea bracteata* (American hogpeanut), *Maianthemum canadense* (Canada mayflower), *Polystichum acrostichoides* (Christmas fern), *Podophyllum peltatum* (mayapple), *Osmunda regalis* (royal fern), *Solidago caesia* (wreath goldenrod), *Onoclea sensibilis* (sensitive fern), *Circaea alpina* (small enchanter's nightshade), *Maianthemum racemosum* (feathery false lily of the valley), *Hypericum punctatum* (spotted St.

Johnswort), *Hackelia virginiana* (beggarslice), *Carex lupulina* (hop sedge), *Ranunculus repens* (creeping buttercup), *Mitchella repens* (partridgeberry), and *Galium triflorum* (fragrant bedstraw).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Carpinus caroliniana* (American hornbeam), *Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Betula lenta* (sweet birch)
Short shrub/sapling	Broad-leaved deciduous shrub	*Fraxinus americana* (white ash), *Rubus hispidus* (bristly dewberry), *Sassafras albidum* (sassafras)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Fern or fern ally	*Osmunda claytoniana* (interrupted fern)

Characteristic Species: *Acer rubrum* (red maple), *Acer saccharum* (sugar maple), *Carya glabra* (pignut hickory), *Fraxinus americana* (white ash), *Osmunda claytoniana* (interrupted fern), *Ostrya virginiana* (hophornbeam), *Podophyllum peltatum* (mayapple), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	I	1	Appalachian oak-hickory forest	Edinger et al. 2002

Local Range: This association occurs in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: SARA.18 (AA), SARA.78 (AA), SARA.114 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Quercus rubra - (Acer saccharum)* Forest Alliance (A.251)

Alliance (English name)*	Northern Red Oak - (Sugar Maple) Forest Alliance
Association	*Acer saccharum - Quercus rubra / Hepatica nobilis* var. *obtusa* Forest
Association (English name)	Sugar Maple - Northern Red Oak / Round-lobe Liverleaf Forest
Ecological System(s)	Appalachian (Hemlock)-Northern Hardwood Forest (CES202.593)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: These are forests of well-drained to moist and often on very rocky slopes. *Fraxinus americana* (white ash) and *Acer saccharum* (sugar maple) are common in the tree canopy, with *Quercus rubra* (northern red oak), *Carya ovata* (shagbark hickory), *Carya glabra* (pignut hickory), *Carya ovalis* (red hickory), *Quercus velutina* (black oak), *Tilia americana* (American basswood), *Betula lenta* (sweet birch), and *Quercus alba* (white oak) as associates. *Tsuga canadensis* (eastern hemlock) can be occasional. *Ostrya virginiana* (hophornbeam) and *Carpinus caroliniana* (American hornbeam) can form a prominent subcanopy. The shrub layer includes *Hamamelis virginiana* (American witchhazel), *Viburnum acerifolium* (mapleleaf viburnum), *Viburnum recognitum* (southern arrowwood), *Cornus florida* (flowering dogwood), *Corylus cornuta* (beaked hazelnut), and *Lindera benzoin* (northern spicebush). The herb layer is often quite diverse with *Carex platyphylla* (broadleaf sedge), *Carex pedunculata* (longstalk sedge), *Carex blanda* (eastern woodland sedge), *Carex laxiflora* (broad looseflower sedge), *Actaea rubra* (red baneberry), *Polygonatum pubescens* (hairy Solomon's seal), *Phegopteris hexagonoptera* (broad beechfern), *Viola rotundifolia* (roundleaf yellow violet), *Thalictrum dioicum* (early meadow-rue), *Hepatica nobilis var. obtusa* (roundlobe hepatica), *Thalictrum thalictroides* (rue anemone), *Festuca subverticillata* (nodding fescue), *Actaea pachypoda* (white baneberry), *Viola sororia* (common blue violet), *Arabis* (rockcress) spp., *Packera obovata* (roundleaf ragwort), and *Arisaema triphyllum* (Jack in the pulpit).

Environmental Description: These are forests of well-drained to moist and often on very rocky slopes.

Vegetation Description: *Fraxinus americana* (white ash) and *Acer saccharum* (sugar maple) are common in the tree canopy, with *Quercus rubra* (northern red oak), *Carya ovata* (shagbark hickory), *Carya glabra* (pignut hickory), *Carya ovalis* (red hickory), *Quercus velutina* (black oak), *Tilia americana* (American basswood), *Betula lenta* (sweet birch), and *Quercus alba* (white oak) as associates. *Tsuga canadensis* (eastern hemlock) can be occasional. *Ostrya virginiana* (hophornbeam) and *Carpinus caroliniana* (American hornbeam) can form a prominent subcanopy. The shrub layer includes *Hamamelis virginiana* (American witchhazel), *Viburnum acerifolium* (mapleleaf viburnum), *Viburnum recognitum* (southern arrowwood), *Cornus florida* (flowering dogwood), *Corylus cornuta* (beaked hazelnut), and *Lindera benzoin* (northern spicebush). The herb layer is often quite diverse with *Carex platyphylla* (broadleaf sedge), *Carex pedunculata* (longstalk sedge), *Carex blanda* (eastern woodland sedge), *Carex laxiflora* (broad looseflower sedge), *Actaea rubra* (red baneberry), *Polygonatum pubescens* (hairy Solomon's seal), *Phegopteris hexagonoptera* (broad beechfern), *Viola rotundifolia* (roundleaf yellow violet), *Thalictrum dioicum* (early meadow-rue), *Hepatica nobilis var. obtusa* (roundlobe hepatica), *Thalictrum thalictroides* (rue anemone), *Festuca subverticillata* (nodding fescue), *Actaea pachypoda* (white baneberry), *Viola sororia* (common blue violet), *Arabis* (rockcress) spp., *Packera obovata* (roundleaf ragwort), and *Arisaema triphyllum* (Jack in the pulpit).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Fraxinus americana* (white ash)
Tree subcanopy	Broad-leaved deciduous tree	*Carpinus caroliniana* (American hornbeam), *Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous tree	*Cornus florida* (flowering dogwood)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Corylus cornuta* (beaked hazelnut), *Hamamelis virginiana* (American witchhazel), *Lindera benzoin* (northern spicebush), *Viburnum acerifolium* (mapleleaf viburnum), *Viburnum recognitum* (southern arrowwood)

Characteristic Species: *Acer saccharum* (sugar maple), *Arisaema triphyllum* (Jack in the pulpit), *Fraxinus americana* (white ash), *Hepatica nobilis* var. *obtusa* (roundlobe hepatica)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: Currently described from central and southern New England in Connecticut, Massachusetts, and New Hampshire.
States/Provinces: CT, MA, NH, NY, VT
Federal Lands: NPS (Saratoga, Weir Farm)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 3 - Weak
Comments: Information not available.
Similar Associations:
Quercus rubra - Carya (glabra, ovata) / Ostrya virginiana / Carex lucorum Forest (CEGL006301)
Related Concepts:
Acer saccharum / Hepatica americana Community (Metzler and Barrett 1996) =
CNE mesic hardwood forest on acidic bedrock/till (Rawinski 1984) B
SNE dry rich forest on acidic/circumneutral bedrock or till (Rawinski 1984) ?

SOURCES

Description Authors: Eastern Ecology Group

References: Damman and Kershner 1977, Eastern Ecology Working Group n.d., Metzler and Barrett 1996, Metzler and Barrett 2001, Metzler and Barrett 2004, NRCS 2004, Rawinski 1984, Sperduto 1997a, Swain and Kearsley 2001, Thompson and Sorenson 2000



Figure F-19. Mesic Sugar Maple - Ash - Oak - Hickory Forest in the Saratoga Battlefield Unit (AA point SARA.114, NYNHP 215). 8/18/2006. NAD 1983 / UTM easting 612233, northing 4761847.

Local Name: Semi-rich Northern Hardwood Forest (CEGL006211)

SYNONYMS

USNVC English Name: Sugar Maple - (White Ash) / Jack-in-the-Pulpit Forest

USNVC Scientific Name: ***Acer saccharum - (Fraxinus americana) / Arisaema triphyllum* Forest**

USNVC Identifier: CEGL006211

LOCAL INFORMATION

Environmental Description: This forest occurs at elevations ranging from 40 to 122 m (130-400 feet) on the slopes of narrow ravines, on level high ground, and on gently sloping hills. Aspect is variable. Soils are moderately deep to very deep, well-drained to very poorly drained channery silt loams, silt loams, and mucky silty clay loams in the Manlius-Nassau complex, Bernardston, Hudson, and Madalin series (NRCS 2004). The underlying bedrock is sandstone, siltstone, and shale in the Austin Glen, Mt. Merino, and Canajoharie formations. Adjacent natural communities include White Pine Successional Forest (CEGL007944), Dry, Rich Oak - Hickory Forest (CEGL006301), Hemlock - Beech - Oak Forest (CEGL006088), White Pine - Hemlock Dry-Mesic Forest (CEGL006328), Northeastern Old Field (CEGL006107), Little Bluestem Old Field (CEGL006333), and Eastern Cattail Marsh (CEGL006153).

Vegetation Description: The nearly closed tree canopy (75-80% cover) of this forest association is strongly dominated by *Acer saccharum* (sugar maple) with associated hardwood species that include *Fraxinus americana* (white ash), *Fagus grandifolia* (American beech), *Tilia americana* (American basswood), *Quercus alba* (white oak), and *Quercus coccinea* (scarlet oak). Additional associates, present in lesser amounts, are *Pinus strobus* (eastern white pine), *Acer rubrum* (red maple), *Carya glabra* (pignut hickory), *Carya ovata* (shagbark hickory), *Populus tremuloides* (quaking aspen), *Betula lenta* (sweet birch), and *Prunus serotina* (black cherry). Canopy trees are 20-25 m tall, and subcanopy trees reach 15 m tall with 50% cover. Many canopy species are present in the subcanopy with the addition of *Ostrya virginiana* (hophornbeam), *Carpinus caroliniana* (American hornbeam), and *Quercus rubra* (northern red oak). Tall shrubs (10-15% cover) include canopy and subcanopy species as well as *Hamamelis virginiana* (American witchhazel) and *Cornus rugosa* (roundleaf dogwood). Additional shrubs present in the short-shrub layer (10-15% cover) are *Lonicera tatarica* (Tatarian honeysuckle), *Rhamnus cathartica* (common buckthorn), *Ribes cynosbati* (eastern prickly gooseberry), and *Prunus virginiana* (chokecherry). The sparse vine layer contains *Vitis riparia* (riverbank grape) and *Parthenocissus quinquefolia* (Virginia creeper). Characteristic herbaceous species of this semi-rich association are *Arisaema triphyllum* (Jack in the pulpit), *Adiantum pedatum* (northern maidenhair), *Carex platyphylla* (broadleaf sedge), *Phegopteris hexagonoptera* (broad beechfern), *Actaea pachypoda* (white baneberry), and *Osmunda claytoniana* (interrupted fern). Additional herbs are *Pilea pumila* (Canadian clearweed), *Podophyllum peltatum* (mayapple), *Carex pensylvanica* (Pennsylvania sedge), *Eurybia divaricata* (white wood aster), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Polystichum acrostichoides* (Christmas fern), *Leersia virginica*

(whitegrass), *Dryopteris intermedia* (intermediate woodfern), *Thelypteris noveboracensis* (New York fern), *Galium circaezans* (licorice bedstraw), *Impatiens capensis* (jewelweed), *Alliaria petiolata* (garlic mustard), *Equisetum hyemale* (scouringrush horsetail), and *Cinna latifolia* (drooping woodreed), among others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech)
Tree canopy	Broad-leaved deciduous tree	*Fraxinus americana* (white ash)
Tree subcanopy	Broad-leaved deciduous tree	*Ostrya virginiana* (hophornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer saccharum* (sugar maple), *Fagus grandifolia* (American beech), *Hamamelis virginiana* (American witchhazel)
Short shrub/sapling	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper), *Vitis riparia* (riverbank grape)
Herb (field)	Forb	*Arisaema triphyllum* (Jack in the pulpit), *Eurybia divaricata* (white wood aster), *Pilea pumila* (Canadian clearweed), *Podophyllum peltatum* (mayapple)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge)
Herb (field)	Fern or fern ally	*Osmunda claytoniana* (interrupted fern)

Characteristic Species: *Acer saccharum* (sugar maple), *Arisaema triphyllum* (Jack in the pulpit), *Fagus grandifolia* (American beech), *Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S3*	B	1	Maple-basswood rich mesic forest	Edinger et al. 2002

Local Range: This community is located in both the Old Saratoga Unit (at Victory Woods) and the Battlefield Unit of Saratoga National Historical Park and extends onto the mapped areas outside the park boundaries.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.71, SARA.120
Accuracy Assessment Observations: SARA.72 (AA), SARA.90 (AA), SARA.100 (AA), SARA.134 (AA), SARA.151 (AA), SARA.245 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Northern Mesic Hardwood and Conifer Forest (M014)
Group	Northern Hardwood – Hemlock - White Pine Forest Group (G163)
Alliance*	*Acer saccharum - Fraxinus americana - Tilia americana* Forest Alliance (A.217)
Alliance (English name)*	Sugar Maple - White Ash - American Basswood Forest Alliance
Association	*Acer saccharum - (Fraxinus americana) / Arisaema triphyllum* Forest
Association (English name)	Sugar Maple - (White Ash) / Jack-in-the-Pulpit Forest
Ecological System(s)	Laurentian-Acadian Northern Hardwoods Forest (CES201.564)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: These are northern hardwood forests of slightly enriched soils in the northern Appalachian Mountains and adjacent northeastern United States and Canada. They occur at moderate elevations of 245 to 610 m (800-2000 feet) on slightly enriched soils, often silt loams derived from pelite or other subacidic bedrock. Ridgetops and slight concavities on hillslopes are both typical settings. They may occur as inclusions within typical northern hardwood forests or may occur over larger areas and be the locally dominant northern hardwood forest. The closed-canopy forest has sparse to moderate shrub cover, moderate herb cover, and may have local carpets of *Acer saccharum* (sugar maple) seedlings in the ground vegetation. Bryoids are a minor component of the forest floor. The canopy is dominated by *Acer saccharum* (sugar maple), frequently with *Fraxinus americana* (white ash) as an associate or even canopy codominant. Other associated hardwood species include *Betula alleghaniensis* (yellow birch) and *Betula lenta* (sweet birch). *Fagus grandifolia* (American beech) is often present but less abundant than in matrix northern hardwood forests. *Liriodendron tulipifera* (tuliptree) may occur in southern New England. Conifers are usually sparse. Shrubs can include *Cornus alternifolia* (alternateleaf dogwood), *Lindera benzoin* (northern spicebush), *Sambucus racemosa* (red elderberry), *Acer pensylvanicum* (striped maple), and *Ostrya virginiana* (hophornbeam). Typical herbs of this semi-rich type, which are scarce or absent from standard beech-birch-maple forests, include *Arisaema triphyllum* (Jack in the pulpit), *Viola rotundifolia* (roundleaf yellow violet), *Tiarella cordifolia* (heartleaf foamflower), *Actaea pachypoda* (white baneberry), *Osmunda claytoniana* (interrupted fern), *Osmunda cinnamomea* (cinnamon fern), *Carex laxiculmis* (spreading sedge), *Carex platyphylla* (broadleaf sedge), *Carex pedunculata* (longstalk sedge), *Eurybia divaricata* (white wood aster), *Botrychium* (grapefern) spp., and *Solidago flexicaulis*

(zigzag goldenrod). These forests are intermediate in nutrient regime and composition between *Acer saccharum - Fraxinus americana - Tilia americana / Acer spicatum / Caulophyllum thalictroides* Forest (CEGL005008) and *Acer saccharum - Betula alleghaniensis - Fagus grandifolia / Viburnum lantanoides* Forest (CEGL006252). They are more depauperate than other communities of this alliance, for example lacking rich-soil indicators such as *Adiantum pedatum* (northern maidenhair), *Caulophyllum thalictroides* (blue cohosh), and *Tilia americana* (American basswood) that are typical of CEGL005008.

Environmental Description: These are northern hardwood forests of slightly enriched soils in the northern Appalachian Mountains and adjacent northeastern United States and Canada. They occur at moderate elevations of 245 to 610 m (800-2000 feet) on slightly enriched soils, often silt loams derived from pelite or other subacidic bedrock. Ridgetops and slight concavities on hillslopes are both typical settings.

Vegetation Description: The closed-canopy forest has sparse to moderate shrub cover, moderate herb cover, and may have local carpets of *Acer saccharum* (sugar maple) seedlings in the ground vegetation. Bryoids are a minor component of the forest floor. The canopy is dominated by *Acer saccharum* (sugar maple), with associated hardwood species including *Betula alleghaniensis* (yellow birch) and *Fraxinus americana* (white ash). *Fraxinus* (ash) may be a canopy codominant in some areas. *Fagus grandifolia* (American beech) is often present but less abundant than in matrix northern hardwood forests. Conifers are usually sparse. Shrubs can include *Cornus alternifolia* (alternateleaf dogwood), *Sambucus racemosa* (red elderberry), *Acer pensylvanicum* (striped maple), and *Ostrya virginiana* (hophornbeam). Typical herbs of this semi-rich type, which are scarce or absent from standard beech-birch-maple forests, include *Arisaema triphyllum* (Jack in the pulpit), *Viola rotundifolia* (roundleaf yellow violet), *Tiarella cordifolia* (heartleaf foamflower), *Actaea pachypoda* (white baneberry), *Botrychium* (grapefern) spp., and *Solidago flexicaulis* (zigzag goldenrod).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Fraxinus americana* (white ash)
Tree subcanopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Acer pensylvanicum* (striped maple), *Cornus alternifolia* (alternateleaf dogwood), *Ostrya virginiana* (hophornbeam), *Sambucus racemosa* (red elderberry)
Herb (field)	Forb	*Arisaema triphyllum* (Jack in the pulpit)

Characteristic Species: *Acer saccharum* (sugar maple), *Arisaema triphyllum* (Jack in the pulpit)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This forest association occurs in New England west to New York and Ontario.

States/Provinces: CT, MA, ME, NB, NH, NY, ON, PA, RI, VT

Federal Lands: NPS (Marsh-Billings-Rockefeller, Saint-Gaudens, Saratoga, Upper Delaware, Weir Farm)

CONSERVATION STATUS

Rank: G4 (7-Dec-2005)

Reasons: This association is fairly well-distributed in northern New England and adjacent Canada.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This type is conceptually well understood, but not well documented in published sources. Additional characterization would be helpful.

Similar Associations:

Acer saccharum - Betula alleghaniensis - Fagus grandifolia / Viburnum lantanoides Forest (CEGL006252)

Acer saccharum - Fraxinus americana - Tilia americana / Acer spicatum / Caulophyllum thalictroides Forest (CEGL005008)

Related Concepts:

Mesic Northern Hardwood Forest (Beech-Birch-Maple Forest)? (Thompson 1996) B

Semi-rich northern hardwood forest (NAP pers. comm. 1998) ?

Sugar Maple: 27 (Eyre 1980) B

SOURCES

Description Authors: S.C. Gawler, mod. L.A. Sneddon

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Eyre 1980, Gawler 2002, Metzler and Barrett 2001, Metzler and Barrett 2004, NAP pers. comm. 1998, NRCS 2004, Sperduto and Nichols 2004, Thompson 1996, Thompson and Sorenson 2000



Figure F-20. Semi-rich Northern Hardwood Forest in the Saratoga Battlefield Unit (AA point SARA.134, NYNHP 275). 7/14/2006. NAD 1983 / UTM easting 611704, northing 4759611.

Local Name: Beech - Maple Glaciated Forest (CEGL005013)

SYNONYMS

USNVC English Name: American Beech - Sugar Maple Glaciated Midwest Forest
USNVC Scientific Name: *Fagus grandifolia* - *Acer saccharum* Glaciated Midwest Forest
USNVC Identifier: CEGL005013

LOCAL INFORMATION

Environmental Description: This association is located on a rolling to hilly north/northeast-facing slope at 76 to 85 m (250-280 feet) in elevation. It has developed on very deep, moderately well-drained soil in the Hudson series (NRCS 2004), and the underlying bedrock is sandstone and shale in the Canajoharie Formation. A small patch of Southern New England Red Maple Seepage Swamp (CEGL006406) is nested within this forest, and the surrounding community is Northeastern Successional Shrubland (CEGL006451).

Vegetation Description: The somewhat closed tree canopy (75-80% cover) of this deciduous upland forest is dominated by *Fagus grandifolia* (American beech) with *Prunus serotina* (black cherry), *Acer saccharum* (sugar maple), *Fraxinus americana* (white ash), *Quercus rubra* (northern red oak), and *Carya ovata* (shagbark hickory). The canopy reaches 25 m in height, and the subcanopy (with 35-40% cover) reaches 12 m tall. Subcanopy composition is dominated by *Carpinus caroliniana* (American hornbeam) and *Fagus grandifolia* (American beech) with lesser amounts of *Acer saccharum* (sugar maple), *Rhamnus cathartica* (common buckthorn), *Ostrya virginiana* (hophornbeam), and *Betula lenta* (sweet birch). Tall and short shrubs are equally dense (15-20% cover) and are dominated by *Fagus grandifolia* (American beech) and *Lonicera tatarica* (Tatarian honeysuckle). *Acer saccharum* (sugar maple) and *Fraxinus pennsylvanica* (green ash) are also common to both layers, and *Rubus allegheniensis* (Allegheny blackberry) is found in the short-shrub layer. Herbaceous species are very sparse, with less than 1% cover, and consist of *Epifagus virginiana* (beechdrops) and *Arisaema triphyllum* (Jack in the pulpit).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fagus grandifolia* (American beech)
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Prunus serotina* (black cherry)
Tree subcanopy	Broad-leaved deciduous tree	*Carpinus caroliniana* (American hornbeam)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Fagus grandifolia* (American beech), *Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Forb	*Epifagus virginiana* (beechdrops)

Characteristic Species: *Fagus grandifolia* (American beech)
Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Beech-maple mesic forest	Edinger et al. 2002

Local Range: This association is located within the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: This midwestern association appears suitable for classification of the *Fagus grandifolia* (American beech) forest stands at Saratoga National Historical Park.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.24

Accuracy Assessment Observations: SARA.215 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Cool Temperate Forest (1.C.2)
Division	Eastern North American Cool Temperate Forest (D008)
Macrogroup	Central Mesophytic-Hardwood Forest (M153)
Group	Appalachian and Interior Mesophytic Forest Group (G020)
Alliance*	*Fagus grandifolia - Acer saccharum - (Liriodendron tulipifera)* Forest Alliance (A.227)
Alliance (English name)*	American Beech - Sugar Maple - (Tuliptree) Forest Alliance
Association	*Fagus grandifolia - Acer saccharum* Glaciated Midwest Forest
Association (English name)	American Beech - Sugar Maple Glaciated Midwest Forest
Ecological System(s)	North-Central Interior Beech-Maple Forest (CES202.693) Southern and Central Appalachian Cove Forest (CES202.373)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This upland forest community is found in the southern Great Lakes area of the United States and Canada. Stands occur on flat to rolling topography. In the southern parts of its range, it is more likely to be found on steeper slopes than in the northern portion. The soils are predominantly silt loam, loam, or sandy loam and develop over glacial till of Wisconsin age. The community is characterized by a dense to moderately dense canopy of deciduous trees, an absent to sparse shrub layer, and a moderately to well-developed herbaceous layer. The canopy is composed primarily of *Acer saccharum* (sugar maple) and *Fagus grandifolia* (American beech). *Liriodendron tulipifera* (tuliptree) is sometimes codominant, and *Carpinus caroliniana* (American hornbeam), *Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam), *Quercus rubra* (northern red oak), *Tilia americana* (American basswood), and *Ulmus americana* (American elm) are often present in the canopy or subcanopy. *Diervilla lonicera* (northern bush honeysuckle), *Euonymus obovatus* (running strawberry bush), *Lonicera canadensis* (American fly honeysuckle), *Sambucus racemosa*

var. racemosa (red elderberry), and *Viburnum* (viburnum) spp. are typical shrubs. The herbaceous layer is often diverse, typically including spring ephemerals. Common species include *Arisaema triphyllum* (Jack in the pulpit), *Dryopteris intermedia* (intermediate woodfern), *Galium aparine* (stickywilly), *Maianthemum canadense* (Canada mayflower) (in northern stands), *Maianthemum racemosum* (feathery false lily of the valley), *Osmorhiza claytonii* (Clayton's sweetroot), *Podophyllum peltatum* (mayapple), *Polygonatum biflorum* (smooth Solomon's seal), *Trillium grandiflorum* (snow trillium), and *Viola* (violet) spp.

Environmental Description: This community is found on flat to rolling topography (Braun 1950, Pell and Mack 1977). In the southern parts of its range, it is more likely to be found on steeper slopes than in the northern portion (Braun 1950). The soils are predominantly silt loam, loam, or sandy loam and develop over glacial till of Wisconsin age (Braun 1950, Dodge and Harman 1985). This community was found to develop on sites with till 0.4-4.0 m thick in southern Michigan (Dodge and Harman 1985).

Vegetation Description: This community is characterized by a dense to moderately dense canopy of deciduous trees, an absent to sparse shrub layer, and a moderately to well-developed herbaceous layer. The canopy formed by the overstory trees and smaller saplings greatly reduces the amount of light that reaches lower vegetation strata. This canopy is composed primarily of *Acer saccharum* (sugar maple) and *Fagus grandifolia* (American beech). *Liriodendron tulipifera* (tuliptree) is sometimes codominant and *Carpinus caroliniana* (American hornbeam), *Fraxinus americana* (white ash), *Ostrya virginiana* (hophornbeam), *Quercus rubra* (northern red oak), *Tilia americana* (American basswood), and *Ulmus americana* (American elm) are often present in the canopy or subcanopy. *Diervilla lonicera* (northern bush honeysuckle), *Euonymus obovatus* (running strawberry bush), *Lonicera canadensis* (American fly honeysuckle), *Sambucus racemosa var. racemosa* (red elderberry), and *Viburnum* (viburnum) spp. are typical shrubs. The herbaceous layer is often diverse, typically including spring ephemerals. Common species include *Arisaema triphyllum* (Jack in the pulpit), *Dryopteris intermedia* (intermediate woodfern), *Galium aparine* (stickywilly), *Maianthemum canadense* (Canada mayflower) (in northern stands), *Maianthemum racemosum* (feathery false lily of the valley), *Osmorhiza claytonii* (Clayton's sweetroot), *Podophyllum peltatum* (mayapple), *Polygonatum biflorum* (smooth Solomon's seal), *Trillium grandiflorum* (snow trillium), and *Viola* (violet) spp.

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This upland forest community is found in the southern Great Lakes area of the United States and Canada, ranging from Illinois, Indiana, and Michigan, east to Ontario and western New York. Range extent is minimally estimated at 70,000 square km and may extend over 200,000 square km.

States/Provinces: IL, IN, MI:S3, NY, OH, ON

Federal Lands: NPS (Indiana Dunes, Saratoga); USFS (Finger Lakes)

CONSERVATION STATUS

Rank: G2G3 (13-Nov-2006)

Reasons: There have been 155 occurrences documented: 3 in Illinois (where the community is ranked S4) (but beech-maple is only a small part of the Illinois type to which this global type is crosswalked), 86 in Indiana (S3), 36 in Michigan (S3), and 30 in Ohio (S3). Although no other occurrences have been documented, the community is also reported in Ontario and New York. Sizes of 129 occurrences total 8895 acres. This type was once a widespread matrix forest that now occupies small remnants, often less than 500 acres in size.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 1 - Strong

Comments: Wisconsin glaciation history is used to define the southern limits of this type, and further work is needed to determine how floristically distinct these glaciated stands are from southern unglaciated stands, which are placed in *Fagus grandifolia - Acer saccharum - Liriodendron tulipifera* Unglaciated Forest (CEGL002411). *Liriodendron tulipifera* (tuliptree) and other southern hardwoods, such as *Liquidambar styraciflua* (sweetgum), are much less constant in this type compared to the unglaciated stands, as is, perhaps, *Asimina triloba* (pawpaw). Northward *Betula alleghaniensis* (yellow birch) and *Betula papyrifera* (paper birch) are very infrequent compared to *Acer saccharum - Fagus grandifolia - Betula* spp. / *Maianthemum canadense* (Canada mayflower) Forest (CEGL005004). In New York and Pennsylvania this type may cover both the glaciated lake till plain and perhaps some parts of the glaciated Allegheny Plateau, consistent with its distribution in Ohio. Arguing for this is the low dominance to absence of *Liriodendron tulipifera* (tuliptree), low dominance of *Betula* (birch) spp., and the high dominance of *Tilia americana* (American basswood). On the other hand, the presence of *Betula lenta* (sweet birch), and perhaps that of *Tsuga canadensis* (eastern hemlock), in that region are somewhat unusual for this type, indicating the more Allegheny influence. And the inclusion of both glaciated till plain and plateau habitats in the type would broaden the environmental parameters. This type may be in east-central Illinois (Vermillion County, near Danville), but is largely extirpated (B. McClain pers. comm. 1999). Stands still occur across the stateline in Indiana.

Similar Associations:

Acer saccharum - Fagus grandifolia - Betula spp. / *Maianthemum canadense* Forest (CEGL005004)
Fagus grandifolia - Acer saccharum - Liriodendron tulipifera Unglaciated Forest (CEGL002411)
Fagus grandifolia - Betula lenta - Liriodendron tulipifera - Acer saccharum Forest (CEGL006296)
Quercus alba - Fagus grandifolia Western Allegheny Plateau Forest (CEGL006144)

Related Concepts:

Fagus grandifolia - Acer saccharum - Podophyllum peltatum association (Pell and Mack 1977) =
Beech - Maple Forest Region (Braun 1950) I
Warren's Woods (Cain 1935) =

SOURCES

Description Authors: J. Drake

References: Braun 1950, Cain 1935, Chapman 1986, Crumpacker et al. 1988, Dodge and Harman 1985, Edinger et al. 2002, Kuchler 1964, Midwestern Ecology Working Group n.d., NRCS 2004, Pell and Mack 1977



Figure F-21. Beech - Maple Glaciated Forest in the Saratoga Battlefield Unit (plot SARA.24, NYNHP E1, photo no. 26). 7/3/2003. NAD 1983 / UTM easting 610155, northing 4763121.

Local Name: Box-elder Floodplain Forest (CEGL005033)

SYNONYMS

USNVC English Name: Box-elder Forest
USNVC Scientific Name: *Acer negundo* Forest
USNVC Identifier: CEGL005033

LOCAL INFORMATION

Environmental Description: This temporarily flooded forest is located on the flats surrounding a marsh headwater stream that is a tributary to the Kroma Kill near its entrance into the Hudson at an elevation of 29 to 30 m (95-100 feet). Soils are somewhat moist, deep to very deep, poorly drained Fluvaquents composed of gravelly loamy sand to silt loam (NRCS 2004). Underlying bedrock is sandstone and shale in the Canajoharie Formation. Adjacent upland communities are Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301) and Hemlock - Beech - Oak Forest (CEGL006088); Hairyfruit Sedge Wetland (CEGL006447) lies just to the north of this forest on the floodplain.

Vegetation Description: The open canopy and subcanopy of this early-successional forest is dominated by *Acer negundo* (box-elder) with *Salix alba* (white willow) occurring as an associate in the canopy. The tree canopy reaches between 15-20 m in height and has 40-45% cover, while the subcanopy is 5-10 m tall with less than 4% cover. Tall-shrub cover is sparse (5-10% cover) with *Acer negundo* (box-elder), *Viburnum nudum var. cassinoides* (withe-rod), *Salix alba* (white willow), *Rhamnus cathartica* (common buckthorn), and *Lonicera tatarica* (Tatarian honeysuckle). Short shrubs are also sparse and consist primarily of *Rubus occidentalis* (black raspberry). Scattered *Apios americana* (groundnut) is present in the vine layer. The dense (85-90% cover) herbaceous layer is strongly dominated by *Matteuccia struthiopteris* (ostrich fern) with lesser amounts of *Eupatorium maculatum* (spotted joepyeweed), *Symplocarpus foetidus* (skunk cabbage), *Glechoma hederacea* (ground ivy), *Solidago gigantea* (giant goldenrod), *Lysimachia nummularia* (creeping jenny), and *Urtica dioica* (stinging nettle). Additional herbaceous species, present in low abundance, are *Boehmeria cylindrica* (smallspike false nettle), *Amphicarpaea bracteata* (American hogpeanut), *Alliaria petiolata* (garlic mustard), *Ageratina altissima var. altissima* (white snakeroot), *Impatiens capensis* (jewelweed), *Phalaris arundinacea* (reed canarygrass), *Onoclea sensibilis* (sensitive fern), *Laportea canadensis* (Canadian woodnettle), *Pilea pumila* (Canadian clearweed), *Polygonum virginianum* (jumpseed), *Carex trichocarpa* (hairyfruit sedge), *Polygonum sagittatum* (arrowleaf tearthumb), *Leersia oryzoides* (rice cutgrass), *Galium palustre* (common marsh bedstraw), *Elymus virginicus* (Virginia wildrye), and others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer negundo* (box-elder)
Tree canopy	Broad-leaved deciduous tree	*Salix alba* (white willow)

Tall shrub/sapling	Broad-leaved deciduous shrub	*Acer negundo* (box-elder), *Rubus occidentalis* (black raspberry)
Herb (field)	Vine/Liana	*Apios americana* (groundnut)
Herb (field)	Forb	*Eupatorium maculatum* (spotted joepyeweed), *Glechoma hederacea* (ground ivy), *Lysimachia nummularia* (creeping jenny), *Solidago gigantea* (giant goldenrod), *Symplocarpus foetidus* (skunk cabbage), *Urtica dioica* (stinging nettle)
Herb (field)	Fern or fern ally	*Matteuccia struthiopteris* (ostrich fern)

Characteristic Species: *Acer negundo* (box-elder), *Eupatorium maculatum* (spotted joepyeweed), *Lysimachia nummularia* (creeping jenny), *Matteuccia struthiopteris* (ostrich fern), *Phalaris arundinacea* (reed canarygrass), *Salix alba* (white willow), *Solidago gigantea* (giant goldenrod), *Symplocarpus foetidus* (skunk cabbage), *Urtica dioica* (stinging nettle)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park.
Classification Comments: This association was used exclusively to classify floodplain forests dominated by *Acer negundo* (box-elder).
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.17, SARA.18
Accuracy Assessment Observations: SARA.185 (AA), SARA.186 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance	*Acer negundo* Temporarily Flooded Forest Alliance (A.278)
Alliance (English name)	Box-elder Temporarily Flooded Forest Alliance
Association	*Acer negundo* Forest
Association (English name)	Box-elder Forest
Ecological System(s)	Central Appalachian River Floodplain (CES202.608)

East Gulf Coastal Plain Large River Floodplain Forest (CES203.489)
Mississippi River Riparian Forest (CES203.190)
South-Central Interior Large Floodplain (CES202.705)
Atlantic Coastal Plain Large River Floodplain Forest (CES203.066)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This semi-open to closed-canopy forest is found on floodplains in the southern, eastern, and midwestern United States. Stands occur on large rivers in the active floodplain and on sandbars, and may form farther from the riverfront following disturbance. Occurrences are mostly on higher floodplain terraces with less rocky soils which were used for agriculture or habitation. They are typically temporarily flooded in the spring. These early-successional forests are dominated by *Acer negundo* (box-elder). Other characteristic species include *Platanus occidentalis* (American sycamore), *Celtis laevigata* (sugarberry), *Acer rubrum* (red maple), *Liriodendron tulipifera* (tuliptree), *Robinia pseudoacacia* (black locust), *Liquidambar styraciflua* (sweetgum), *Acer saccharinum* (silver maple), *Ulmus alata* (winged elm), *Ulmus rubra* (slippery elm), *Carpinus caroliniana* (American hornbeam), *Morus rubra* (red mulberry), and *Populus deltoides* (eastern cottonwood). The shrub and herb layers range from sparse to relatively lush, and the vine component often is heavy.

Environmental Description: Stands occur on large rivers in the active floodplain and on sandbars, and may form farther from the riverfront following disturbance. Occurrences are mostly on higher floodplain terraces with less rocky soils which were used for agriculture or habitation. They are typically temporarily flooded in the spring and have sandy soils. In Kentucky, these forests may also occur in old fields.

Vegetation Description: These early-successional forests (sometimes woodlands) are dominated by *Acer negundo* (box-elder). Other characteristic species include *Platanus occidentalis* (American sycamore), *Celtis laevigata* (sugarberry), *Acer rubrum* (red maple), *Liriodendron tulipifera* (tuliptree), *Robinia pseudoacacia* (black locust), *Liquidambar styraciflua* (sweetgum), *Acer saccharinum* (silver maple), *Ulmus alata* (winged elm), *Ulmus rubra* (slippery elm), *Carpinus caroliniana* (American hornbeam), *Morus rubra* (red mulberry), and *Populus deltoides* (eastern cottonwood). The shrub and herb layers range from sparse to relatively lush, and the vine component often is heavy. *Lindera benzoin* (northern spicebush) may be dominant in the shrub layer. The herb layer consists of a mixture of weedy exotics and native floodplain species, including *Ageratina altissima* (white snakeroot), *Boehmeria cylindrica* (smallspike false nettle), *Carex grayi* (Gray's sedge), *Glechoma hederacea* (ground ivy), *Lysimachia nummularia* (creeping jenny), *Mertensia virginica* (Virginia bluebells), *Prunella vulgaris* (common selfheal), and *Verbesina alternifolia* (wingstem). The range, dynamics, and variability of this type are complicated by the "weedy" nature of *Acer negundo* (box-elder), e.g., in Kentucky, *Acer negundo* (box-elder) may be dominant in old fields, with *Dichanthelium clandestinum* (deertongue) and *Carex* (sedge) spp. in the ground layer. Elsewhere in the Midwest, logged and grazed stands of *Fraxinus pennsylvanica* (green ash) and *Ulmus americana* (American elm) may be dominated by *Acer negundo* (box-elder).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer negundo* (box-elder)

Characteristic Species: *Acer negundo* (box-elder), *Acer saccharinum* (silver maple), *Ageratina altissima* (white snakeroot), *Boehmeria cylindrica* (smallspike false nettle), *Carex grayi* (Gray's sedge), *Lindera benzoin* (northern spicebush), *Liquidambar styraciflua* (sweetgum), *Mertensia virginica* (Virginia bluebells), *Platanus occidentalis* (American sycamore), *Prunella vulgaris* (common selfheal), *Robinia pseudoacacia* (black locust), *Ulmus americana* (American elm), *Verbesina alternifolia* (wingstem)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This *Acer negundo* (box-elder) floodplain forest is found sporadically on floodplains in the southern, eastern, and midwestern United States, ranging from Maryland west to Iowa (and possibly southeastern South Dakota), south to Louisiana and possibly Texas, and east to Georgia. It occurs in the Piedmont region in Pennsylvania and in the Coastal Plain and Piedmont regions in New Jersey and Delaware.

States/Provinces: AL, AR, DE, GA, IA, KY, LA, MD, MO, MS, NJ, NY, OK, PA, SC, SD?, TN, TX?, VA, WV

Federal Lands: NPS (Chickamauga-Chattanooga, Mammoth Cave, Natchez Trace, New River Gorge, Ozark, Saratoga, Shiloh, Vicksburg); USFS (Daniel Boone, St. Francis); USFWS (Little River)

CONSERVATION STATUS

Rank: G4G5 (28-Mar-2003)

Reasons: As currently defined, this is a broad-ranging community type. However, the range, dynamics, and variability of this type are complicated by the "weedy" nature of *Acer negundo* (box-elder). More information may be needed to clarify the extent to which this type represents purely natural vegetation. Some stands may develop following disturbance of other natural bottomland communities.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: The range, dynamics, and variability of this type is complicated by the 'weedy' nature of *Acer negundo* (box-elder). For example, disturbed stands in the *Fraxinus pennsylvanica - Ulmus americana - Celtis (occidentalis, laevigata)* Temporarily Flooded Forest Alliance (A.286) often become dominated by *Acer negundo* (box-elder). And in the upper Midwest *Acer negundo* (box-elder)-dominated stands are treated as part of the *Fraxinus pennsylvanica - (Ulmus americana) / Symphoricarpos occidentalis* Forest (CEGL002088). Thus, some consistency is needed in the application of this type across its range. In Arkansas, these forests can be pure *Acer negundo* (box-elder) or have *Acer rubrum* (red maple) and *Platanus occidentalis* (American sycamore) as associates (T. Foti pers. comm. 1999). Composition is variable. This type occurs along the Arkansas River in

Arkansas (D. Zollner pers. comm. 1999). In Missouri, stands would probably be combined with *Betula nigra - Platanus occidentalis* Forest (CEGL002086) (M. Leahy pers. comm. 1999). In Kentucky, this may be found at the Licking River impoundment (Cave Run Lake). Narrower floodplains of smaller rivers and streams are not included in this association but are treated instead under *Acer negundo - (Platanus occidentalis, Populus deltoides)* Forest (CEGL004690).

Similar Associations:

Acer negundo - (Platanus occidentalis, Populus deltoides) Forest (CEGL004690)
Betula nigra - Platanus occidentalis Forest (CEGL002086)
Fraxinus pennsylvanica - (Ulmus americana) / Symphoricarpos occidentalis Forest (CEGL002088)
Fraxinus pennsylvanica - Ulmus americana - (Acer negundo, Tilia americana) Northern Forest (CEGL002089)
Fraxinus pennsylvanica - Ulmus spp. - *Celtis occidentalis* Forest (CEGL002014)

Related Concepts:

Acer negundo riparian woodland (Vanderhorst 2001b) =

SOURCES

Description Authors: mod. E. Largay and S.C. Gawler

References: Blair 1938, Campbell pers. comm., Fleming et al. 2001, Foti pers. comm., Harrison 2004, Hoagland 2000, INAI unpubl. data, Leahy pers. comm., NRCS 2004, Patterson and DeSelm 1989, Schotz pers. comm., Southeastern Ecology Working Group n.d., TDNH unpubl. data, Vanderhorst 2001b, Vanderhorst et al. 2007, Zollner pers. comm.



Figure F-22. Box-elder Floodplain Forest in the Saratoga Battlefield Unit (plot SARA.17, NYNHP C2, photo no. 21). 6/18/2003. NAD 1983 / UTM easting 613126, northing 4761952.

Local Name: Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)

SYNONYMS

USNVC English Name:	**Green Ash - (Black Walnut, Sycamore) Forest**
USNVC Scientific Name:	***Fraxinus pennsylvanica - (Juglans nigra, Platanus occidentalis)* Forest**
USNVC Identifier:	**CEGL006575**

LOCAL INFORMATION

Environmental Description: This floodplain forest primarily occurs in two settings at Saratoga: on the broad, level floodplain of the Hudson River at 27 m (90 feet) in elevation and in higher-elevation (to 61 m [200 feet]), headwater stream shorelines and terraces. It is periodically inundated and has moist to wet soils. The substrate is very deep to moderately deep, poorly drained to well-drained soils composed of silt loam, channery silt loam, fine sandy loam, loamy sand, and gravelly loamy sand in the Bernardston, Manlius-Nassau complex, Hudson, Rhinebeck, Fluvaquents, Udipsamments, Limerick-Saco complex, Teel, and Tioga series (NRCS 2004). The underlying bedrock is siltstone, sandstone, and shale in the Mt. Merino and Canajoharie formations. On the floodplain of the Hudson, this community is adjacent to a suite of wetland types, including Silver Maple Floodplain Bottom Forest (Sensitive Fern Type) (CEGL006176), Common Buttonbush Shrub Swamp (CEGL006069), Reed Canarygrass Eastern Marsh (CEGL006044), and Eastern Cattail Marsh (CEGL006153), as well as upland forests, such as Northeastern Oak - Red Maple Successional Forest (CEGL006506), Northeastern Dry Oak - Hickory Forest (CEGL006336), croplands, and mowed lawns. At higher elevations, adjacent communities include Hairyfruit Sedge Wetland (CEGL006447), Northeastern Old Field (CEGL006107), Northeastern Modified Successional Forest (CEGL006599), White Pine Successional Forest (CEGL007944), White Pine Plantation (CEGL007178), and White Pine - Oak Forest (CEGL006293).

Vegetation Description: The open canopy and subcanopy of this floodplain forest are strongly dominated by *Fraxinus pennsylvanica* (green ash). Associated canopy species, which vary by site, are *Acer saccharinum* (silver maple), *Salix alba* (white willow), *Quercus bicolor* (swamp white oak), *Juglans nigra* (black walnut), *Carya cordiformis* (bitternut hickory), *Robinia pseudoacacia* (black locust), *Prunus serotina* (black cherry), *Acer rubrum* (red maple), *Tilia americana* (American basswood), *Ulmus americana* (American elm), *Acer saccharum* (sugar maple), *Celtis occidentalis* (common hackberry), *Quercus rubra* (northern red oak), *Carya ovata* (shagbark hickory), *Fagus grandifolia* (American beech), *Pinus strobus* (eastern white pine), *Populus grandidentata* (bigtooth aspen), *Populus deltoides* (eastern cottonwood), and *Malus pumila* (paradise apple). The canopy is 20-25 m tall and has 65-70% cover. Many of the same associated species occur in the subcanopy layer, with the addition of the exotic species *Acer platanoides* (Norway maple) and *Rhamnus cathartica* (common buckthorn). The tall- and short-shrub layers each have nearly 30% cover and are dominated by *Lonicera tatarica* (Tatarian honeysuckle). The tall-shrub layer also contains saplings of the canopy and subcanopy species as well as *Cephalanthus occidentalis* (common buttonbush),

Carpinus caroliniana (American hornbeam), *Cornus amomum* (silky dogwood), *Ilex verticillata* (common winterberry), *Viburnum lentago* (nannyberry), *Alnus incana ssp. rugosa* (speckled alder), and *Rhus typhina* (=*Rhus hirta*) (staghorn sumac). Additional species that occur in the short-shrub layer are *Rubus allegheniensis* (Allegheny blackberry), *Rubus occidentalis* (black raspberry), *Rubus flagellaris* (northern dewberry), and *Viburnum dentatum* (southern arrowwood). *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy), and *Vitis riparia* (riverbank grape) occur in the sparse vine layer. Herbaceous composition is diverse and reaches nearly 65% cover, depending on degree of canopy closure. The most abundant species are *Onoclea sensibilis* (sensitive fern), *Lysimachia nummularia* (creeping jenny), *Phalaris arundinacea* (reed canarygrass), *Alliaria petiolata* (garlic mustard), *Solidago gigantea* (giant goldenrod), *Boehmeria cylindrica* (smallspike false nettle), *Poa pratensis* (Kentucky bluegrass), *Carex trichocarpa* (hairyfruit sedge), *Matteuccia struthiopteris* (ostrich fern), *Sparganium eurycarpum* (broadfruit bur-reed), *Urtica dioica* (stinging nettle), *Ageratina altissima var. altissima* (white snakeroot), and *Oxalis stricta* (common yellow oxalis). Additional species, present in lesser amounts, are *Impatiens pallida* (pale touch-me-not), *Leersia oryzoides* (rice cutgrass), *Elymus virginicus* (Virginia wildrye), *Amphicarpaea bracteata* (American hogpeanut), *Polygonum virginianum* (jumpseed), *Pilea pumila* (Canadian clearweed), *Ludwigia palustris* (marsh seedbox), *Peltandra virginica* (green arrow arum), *Carex gynandra* (nodding sedge), *Galium palustre* (common marsh bedstraw), *Fragaria virginiana* (Virginia strawberry), *Lycopus uniflorus* (northern bugleweed), *Cinna latifolia* (drooping woodreed), *Typha latifolia* (broadleaf cattail), *Impatiens capensis* (jewelweed), *Clinopodium vulgare* (wild basil), *Eupatorium maculatum* (spotted joepyeweed), *Potentilla canadensis* (dwarf cinquefoil), *Dulichium arundinaceum* (threeway sedge), *Polygonum sagittatum* (arrowleaf tearthumb), and many others. The floating aquatic layer has sparse amounts of *Spirodela polyrrhiza* (common duckmeat).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard), *Boehmeria cylindrica* (smallspike false nettle), *Lysimachia nummularia* (creeping jenny), *Solidago gigantea* (giant goldenrod)
Herb (field)	Graminoid	*Phalaris arundinacea* (reed canarygrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Acer saccharinum* (silver maple), *Boehmeria cylindrica* (smallspike false nettle), *Fraxinus pennsylvanica* (green ash), *Lonicera tatarica* (Tatarian honeysuckle), *Lysimachia nummularia* (creeping jenny), *Onoclea sensibilis* (sensitive fern)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary. Generally, it is on the broad, level Bemis Heights floodplain of the Hudson River and on the shorelines and terraces around headwater tributaries of Mill Creek and the Kroma Kill.
Classification Comments: This association was used exclusively to classify floodplain forests dominated by *Fraxinus pennsylvanica* (green ash).
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.76, SARA.101, SARA.107, SARA.109, SARA.112
Accuracy Assessment Observations: SARA.77 (AA), SARA.93 (AA), SARA.123 (AA), SARA.152 (AA), SARA.189 (AA), SARA.193 (AA), SARA.211 (AA), SARA.213 (AA), SARA.214 (AA), SARA.222 (AA), SARA.223 (AA), SARA.248 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance*	*Fraxinus pennsylvanica - Ulmus americana - Celtis (occidentalis, laevigata)* Temporarily Flooded Forest Alliance (A.286)
Alliance (English name)*	Green Ash - American Elm - (Common Hackberry, Sugarberry) Temporarily Flooded Forest Alliance
Association	*Fraxinus pennsylvanica - (Juglans nigra, Platanus occidentalis)* Forest
Association (English name)	Green Ash - (Black Walnut, Sycamore) Forest
Ecological System(s)	Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This is a green ash - mixed hardwood floodplain forest of the northern Piedmont in the mid-Atlantic eastern United States. It occurs behind levees and on low terraces that

are flooded annually for short durations (less than one week per year). Water table is high for the majority of the growing season. Soils are generally silts or clay loams but can have coarser substrates where flood water velocity is higher. The canopy is codominated by *Fraxinus pennsylvanica* (green ash) with *Juglans nigra* (black walnut) and/or *Platanus occidentalis* (American sycamore). Additional associates include *Ulmus americana* (American elm), *Celtis occidentalis* (common hackberry), *Acer rubrum* (red maple), *Acer saccharinum* (silver maple), and *Quercus palustris* (pin oak). In some areas *Fraxinus americana* (white ash) may be present in place of *Fraxinus pennsylvanica* (green ash). Subcanopy and shrub layers are sparse and generally comprised of canopy species regeneration plus *Carpinus caroliniana* (American hornbeam), *Carya cordiformis* (bitternut hickory), *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Viburnum prunifolium* (blackhaw), and *Viburnum dentatum* (southern arrowwood). The invasive shrubs *Rosa multiflora* (multiflora rose), *Lonicera morrowii* (Morrow's honeysuckle), *Berberis thunbergii* (Japanese barberry), and *Lonicera japonica* (Japanese honeysuckle) can be problematic. Herbaceous species, where exotics are not rampant, can include *Impatiens pallida* (pale touch-me-not), *Impatiens capensis* (jewelweed), *Laportea canadensis* (Canadian woodnettle), *Verbesina alternifolia* (wingstem), *Thalictrum pubescens* (king of the meadow), *Hydrophyllum canadense* (bluntleaf waterleaf), *Podophyllum peltatum* (mayapple), *Symplocarpus foetidus* (skunk cabbage), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Boehmeria cylindrica* (smallspike false nettle), *Onoclea sensibilis* (sensitive fern), *Arisaema triphyllum* (Jack in the pulpit), and *Viola* (violet) spp. Woody vines include *Toxicodendron radicans* (eastern poison ivy) and *Parthenocissus quinquefolia* (Virginia creeper). Exotic species tend to dominate the herb layer, including *Alliaria petiolata* (garlic mustard), *Glechoma hederacea* (ground ivy), and *Microstegium vimineum* (Nepalese browntop). Diagnostic features of this floodplain forest include the presence of *Juglans nigra* (black walnut) and rich herbs.

Environmental Description: These floodplain forests occur behind levees and on low terraces or mid terraces that are flooded annually for short durations (less than one week per year). It also occurs on islands, bars, and mid-terrace shorelines. The water table is high for the majority of the growing season. Soils are generally silts, sandy loams, or clay loams but can have coarser substrates where floodwater velocity is higher.

Vegetation Description: The canopy is codominated by *Fraxinus pennsylvanica* (green ash) with *Juglans nigra* (black walnut) and/or *Platanus occidentalis* (American sycamore). Additional associates include *Ulmus americana* (American elm), *Celtis occidentalis* (common hackberry), *Acer rubrum* (red maple), *Acer saccharinum* (silver maple), and *Quercus palustris* (pin oak). Subcanopy and shrub layers are sparse and generally comprised of canopy species regeneration plus *Carpinus caroliniana* (American hornbeam), *Carya cordiformis* (bitternut hickory), *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Viburnum prunifolium* (blackhaw), and *Viburnum dentatum* (southern arrowwood). The invasive shrubs *Rosa multiflora* (multiflora rose), *Lonicera morrowii* (Morrow's honeysuckle), *Berberis thunbergii* (Japanese barberry), and *Lonicera japonica* (Japanese honeysuckle) can be problematic. Herbaceous species, where exotics are not rampant, can include *Impatiens pallida* (pale touch-me-not), *Impatiens capensis* (jewelweed), *Laportea canadensis*

(Canadian woodnettle), *Verbesina alternifolia* (wingstem), *Thalictrum pubescens* (king of the meadow), *Hydrophyllum canadense* (bluntleaf waterleaf), *Podophyllum peltatum* (mayapple), *Symplocarpus foetidus* (skunk cabbage), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Boehmeria cylindrica* (smallspike false nettle), *Onoclea sensibilis* (sensitive fern), *Arisaema triphyllum* (Jack in the pulpit), and *Viola* (violet) spp. Woody vines include *Toxicodendron radicans* (eastern poison ivy) and *Parthenocissus quinquefolia* (Virginia creeper). Exotic species tend to dominate the herb layer, including *Alliaria petiolata* (garlic mustard), *Glechoma hederacea* (ground ivy), and *Microstegium vimineum* (Nepalese browntop). Diagnostic features of this floodplain forest include the presence of *Juglans nigra* (black walnut) and rich herbs.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum* (silver maple)
Tree canopy	Broad-leaved deciduous tree	*Betula nigra* (river birch), *Fraxinus pennsylvanica* (green ash), *Platanus occidentalis* (American sycamore)
Tree subcanopy	Broad-leaved deciduous tree	*Carpinus caroliniana* (American hornbeam)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood)
Short shrub/sapling	Broad-leaved deciduous shrub	*Lindera benzoin* (northern spicebush)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Ageratina altissima* var. *altissima* (white snakeroot), *Podophyllum peltatum* (mayapple)

Characteristic Species: *Acer saccharinum* (silver maple), *Betula nigra* (river birch), *Carpinus caroliniana* (American hornbeam), *Cornus amomum* (silky dogwood), *Fraxinus pennsylvanica* (green ash), *Platanus occidentalis* (American sycamore), *Podophyllum peltatum* (mayapple), *Symplocarpus foetidus* (skunk cabbage)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: Currently described from the northern Piedmont of Pennsylvania, Delaware, New Jersey, and possibly Maryland.

States/Provinces: DE, MD?, NJ, NY, PA

Federal Lands: NPS (Delaware Water Gap, Saratoga)

CONSERVATION STATUS

Rank: GNR (21-Apr-2004)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate
Comments: Information not available.
Similar Associations:
Fraxinus pennsylvanica - Ulmus spp. - *Celtis occidentalis* Forest (CEGL002014)
Platanus occidentalis - Fraxinus pennsylvanica - Ulmus americana / Cornus sericea Forest (CEGL006901)
Related Concepts: Information not available.
SOURCES
Description Authors: S.L. Neid, mod. S.C. Gawler
References: Bowman 2000, Breden et al. 2001, Clancy 1996, Eastern Ecology Working Group n.d., Fike 1999, NRCS 2004, Podniesinski and Wagner 2002, WPC and TNC 2002



Figure F-23. Green Ash - Mixed Hardwood Floodplain Forest in the Saratoga Battlefield Unit (plot SARA.101, NYNHP SF01, photo no. 554). 7/21/2004. NAD 1983 / UTM easting 612310, northing 4759300.

Local Name: Silver Maple - Elm Floodplain Forest (CEGL006001)

SYNONYMS

USNVC English Name: **Silver Maple - American Elm / Sensitive Fern Forest**
USNVC Scientific Name: ***Acer saccharinum* - *Ulmus americana* / *Onoclea sensibilis* Forest**
USNVC Identifier: **CEGL006001**

LOCAL INFORMATION

Environmental Description: This association occurs on the level floodplain of the Hudson River at elevations between 25 and 30 m (85-100 feet). Former beaver flooding is evident within the forest, which is periodically inundated and has a very wet substrate. Soils are very deep, poorly drained to moderately well-drained silt loams and gravelly loamy sands in the Limerick-Saco complex, Hudson, Fluvaquents, and Teel series (NRCS 2004). The underlying bedrock is shale and sandstone in the Canajoharie Formation. This forest occurs in a mosaic with other floodplain forest types, mainly Silver Maple / Sensitive Fern floodplain forest (CEGL006176) and Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575).

Vegetation Description: The open canopy of this floodplain forest is dominated by *Acer saccharinum* (silver maple) with *Salix alba* (white willow), *Fraxinus pennsylvanica* (green ash), and *Ulmus americana* (American elm) as associates. The canopy trees range from 25-30 m tall and have 55-60% cover. The somewhat sparse (35% cover) subcanopy, which is 15-20 m tall, consists of the same suite of species in varying proportions. The very sparse (6% cover) short-shrub layer is dominated by *Viburnum lentago* (nannyberry) with saplings of *Fraxinus pennsylvanica* (green ash). Scattered seedlings of *Acer saccharinum* (silver maple) make up the short-shrub layer. Vines have 5-10% cover and can extend 8 m into the subcanopy; common species are *Vitis riparia* (riverbank grape), *Menispermum canadense* (common moonseed), and *Parthenocissus quinquefolia* (Virginia creeper). The herbaceous layer is dense (85% cover) due to the open canopy; *Lysimachia nummularia* (creeping jenny) is the most abundant species. Additional herbs are *Matteuccia struthiopteris* (ostrich fern), *Carex lupulina* (hop sedge), *Carex gynandra* (nodding sedge), *Pilea pumila* (Canadian clearweed), *Leersia oryzoides* (rice cutgrass), *Iris pseudacorus* (paleyellow iris), *Boehmeria cylindrica* (smallspike false nettle), *Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern), *Lobelia cardinalis* (cardinalflower), *Eupatorium maculatum* (spotted joepyeweed), *Elymus virginicus* (Virginia wildrye), *Carex grayi* (Gray's sedge), *Anemone canadensis* (Canadian anemone), *Ludwigia palustris* (marsh seedbox), *Lycopus uniflorus* (northern bugleweed), *Amphicarpaea bracteata* (American hogpeanut), and *Phalaris arundinacea* (reed canarygrass), among others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash)
Tree canopy	Broad-leaved deciduous tree	*Salix alba* (white willow)

Tree subcanopy	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Viburnum lentago* (nannyberry)
Short shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharinum* (silver maple)
Herb (field)	Vine/Liana	*Vitis riparia* (riverbank grape)
Herb (field)	Forb	*Lysimachia nummularia* (creeping jenny)
Herb (field)	Graminoid	*Carex lupulina* (hop sedge)
Herb (field)	Fern or fern ally	*Matteuccia struthiopteris* (ostrich fern)

Characteristic Species: *Acer saccharinum* (silver maple), *Carex gynandra* (nodding sedge), *Carex lupulina* (hop sedge), *Carex tuckermanii* (Tuckerman's sedge), *Fraxinus pennsylvanica* (green ash), *Iris pseudacorus* (paleyellow iris), *Leersia oryzoides* (rice cutgrass), *Lysimachia nummularia* (creeping jenny)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park (in part on the Bemis Heights floodplain) as well as in the mapped areas outside the park boundary.

Classification Comments: A more developed shrub layer and the presence of damp swales with large-fruited Carices, such as *Carex lupulina* (hop sedge), *Carex gynandra* (nodding sedge), and *Carex tuckermanii* (Tuckerman's sedge), help classify this association at Saratoga National Historical Park.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.5, SARA.177

Accuracy Assessment Observations: None

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance*	*Acer (rubrum, saccharinum) - Ulmus americana* Temporarily Flooded Forest Alliance (A.299)
Alliance (English name)*	(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance
Association	*Acer saccharinum - Ulmus americana / Onoclea sensibilis* Forest

Association (English name) Silver Maple - American Elm / Sensitive Fern Forest
Ecological System(s) Central Appalachian River Floodplain (CES202.608)
* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This floodplain forest is currently described from higher terraces along the lower reaches of larger rivers where flood depth and duration is relatively less than immediately adjacent to the river channel. The canopy is strongly dominated by *Acer saccharinum* (silver maple). *Ulmus rubra* (slippery elm), *Ulmus americana* (American elm), *Prunus serotina* (black cherry), and *Fraxinus pennsylvanica* (green ash) can occur in the subcanopy. *Populus deltoides* (eastern cottonwood) can occur sporadically, generally identifying locations of former sandy, drainage channels. The shrub layer is present, unlike adjacent areas on lower terraces. Species include *Viburnum recognitum* (southern arrowwood), *Viburnum dentatum* (southern arrowwood), *Lindera benzoin* (northern spicebush), and *Cornus sericea* (redosier dogwood). The herb layer is strongly dominated by *Onoclea sensibilis* (sensitive fern) interspersed with lesser amounts of *Cinna arundinacea* (sweet woodreed), *Geum canadense* (white avens), *Chelone glabra* (white turtlehead), *Impatiens capensis* (jewelweed), *Carex crinita* (fringed sedge), *Carex lupulina* (hop sedge), and *Carex grayi* (Gray's sedge). Often occurs in association with *Acer saccharinum - Populus deltoides* floodplain forests, or on larger rivers than those supporting the *Quercus palustris - Acer rubrum*.

Environmental Description: Information not available.

Vegetation Description: Information not available.

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Information not available.

States/Provinces: CT, DE?, MA, NJ, NY

Federal Lands: NPS (Saratoga); USFWS (Great Meadows, Oxbow)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations: Information not available.

Related Concepts:

Lakeside Floodplain Forest (Thompson 1996) B
Riverine Floodplain Forest (Thompson 1996) B
Southern New England floodplain forest (Rawinski 1984) ?

SOURCES

Description Authors: S.L. Neid, mod. E. Largay

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Swain and Kearsley 2001, Thompson 1996



Figure F-24. Silver Maple - Elm Floodplain Forest in the Saratoga Battlefield Unit (plot SARA.5, NYNHP B4, photo no. 14). 6/17/2003. NAD 1983 / UTM easting 611703, northing 4758889.

Local Name: Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176)

SYNONYMS

USNVC English Name: **Silver Maple / Sensitive Fern - Small-spike False Nettle Forest**
USNVC Scientific Name: ***Acer saccharinum / Onoclea sensibilis - Boehmeria cylindrica* Forest**
USNVC Identifier: **CEGL006176**

LOCAL INFORMATION

Environmental Description: This temporarily flooded forest primarily occurs at 26 to 27 m (85-90 feet) in elevation on the broad, level floodplain of the Hudson River. It has also developed on the gently sloping shorelines of major tributaries (Mill Creek, Kroma Kill, Fish Creek) at slightly higher elevation (to 55 m [180 feet]). Soils are moist to somewhat wet, shallow to very deep, very poorly drained to somewhat excessively well-drained silt loams, gravelly loamy sands, gravelly sandy loams, channery silt loams, and muck in the Limerick-Saco complex, Hudson, Fluvaquents, Teel, Nassau-Rock outcrop complex, Manlius-Nassau complex, Bernardston, Bernardston-Manlius-Nassau complex, Palms, and Hoosic series **(**NRCS 2004). The underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. This association commonly occurs in a mosaic with other floodplain forest types, such as Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575) and Silver Maple - Elm Floodplain Forest (CEGL006001), and it surrounds patches of Common Duckweed Herbaceous Vegetation (CEGL005451), Reed Canarygrass Eastern Marsh (CEGL006044), Eastern Cattail Marsh (CEGL006153), Common Buttonbush Shrub Swamp (CEGL006069), and Northeastern Leafy Forb Marsh (CEGL006191). Adjacent uplands are Northeastern Oak - Red Maple Successional Forest (CEGL006506), Early-Successional Woodland/Forest (CEGL006303), and Northeastern Old Field (CEGL006107).

Vegetation Description: The canopy of this floodplain forest is somewhat open and is high and arching. Shrubs are less abundant; the herb layer is very diverse and well-developed. The overall effect is of tall, well-spaced trees over a lush carpet of herbs. The canopy and subcanopy are strongly dominated by *Acer saccharinum* (silver maple). Associated canopy trees include *Fraxinus pennsylvanica* (green ash), *Populus deltoides* (eastern cottonwood), *Salix alba* (white willow), *Carya cordiformis* (bitternut hickory), *Acer rubrum* (red maple), *Carya ovata* (shagbark hickory), *Ulmus americana* (American elm), *Celtis occidentalis* (common hackberry), and *Quercus bicolor* (swamp white oak). The tree canopy is 20-25 m tall with nearly 65% cover; the subcanopy is 10-15 m tall with 20% cover. Additional tree species in the subcanopy layer are *Acer negundo* (box-elder) and *Carpinus caroliniana* (American hornbeam). The sparse (10-20% cover) tall- and short-shrub layers consist of *Lonicera tatarica* (Tatarian honeysuckle), *Cephalanthus occidentalis* (common buttonbush), *Ilex verticillata* (common winterberry), *Cornus amomum* (silky dogwood), *Alnus incana ssp. rugosa* (speckled alder), *Ribes glandulosum* (skunk currant), *Sambucus canadensis* (=*Sambucus nigra* spp. *canadensis*) (common elderberry), and species from the canopy and subcanopy layers. *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy), *Vitis*

riparia (riverbank grape), and *Menispermum canadense* (common moonseed) are components of the very sparse vine layer. Herbaceous cover is somewhat dense (65-70% cover) and diverse. The most abundant species are *Onoclea sensibilis* (sensitive fern), *Phalaris arundinacea* (reed canarygrass), *Lysimachia nummularia* (creeping jenny), *Boehmeria cylindrica* (smallspike false nettle), *Matteuccia struthiopteris* (ostrich fern), *Pilea pumila* (Canadian clearweed), and *Sparganium eurycarpum* (broadfruit bur-reed) with lesser amounts of *Leersia oryzoides* (rice cutgrass), *Laportea canadensis* (Canadian woodnettle), *Impatiens capensis* (jewelweed), *Peltandra virginica* (green arrow arum), *Myosotis laxa* (bay forget-me-not), *Ludwigia palustris* (marsh seedbox), *Urtica dioica* (stinging nettle), and *Athyrium filix-femina* (common ladyfern). Many additional species are present in quite sparse amounts. They include *Glechoma hederacea* (ground ivy), *Elymus virginicus* (Virginia wildrye), *Polygonum punctatum* (dotted smartweed), *Carex gynandra* (nodding sedge), *Amphicarpaea bracteata* (American hogpeanut), *Polygonum sagittatum* (arrowleaf tearthumb), *Polygonum virginianum* (jumpseed), *Lythrum salicaria* (purple loosestrife), *Polygonum cuspidatum* (Japanese knotweed), *Cinna latifolia* (drooping woodreed), *Lycopus uniflorus* (northern bugleweed), *Ageratina altissima var. altissima* (white snakeroot), *Solidago gigantea* (giant goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), *Iris pseudacorus* (paleyellow iris), *Lysimachia ciliata* (fringed loosestrife), *Bidens connata* (purplestem beggarticks), *Xanthium strumarium* (rough cockleburr), *Viola cucullata* (marsh blue violet), *Arisaema triphyllum* (Jack in the pulpit), *Polygonum hydropiper* (marshpepper knotweed), *Carex grayi* (Gray's sedge), *Geum canadense* (white avens), *Hesperis matronalis* (dames rocket), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Galium palustre* (common marsh bedstraw), and others. The floating aquatic herb *Lemna minor* (common duckweed) is present at low abundance.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash)
Tree subcanopy	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush), *Lonicera tatarica* (Tatarian honeysuckle)
Short shrub/sapling	Broad-leaved deciduous shrub	*Acer saccharinum* (silver maple)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy)
Herb (field)	Forb	*Lysimachia nummularia* (creeping jenny)
Herb (field)	Graminoid	*Phalaris arundinacea* (reed canarygrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Nonvascular	Moss	*Brachythecium salebrosum* (brachythecium moss)
Floating aquatic	Aquatic herb (floating & submergent)	*Lemna minor* (common duckweed)

Characteristic Species: *Acer saccharinum* (silver maple), *Boehmeria cylindrica* (smallspike false nettle), *Cephalanthus occidentalis* (common buttonbush), *Fraxinus pennsylvanica* (green ash), *Lysimachia nummularia* (creeping jenny), *Onoclea sensibilis* (sensitive fern), *Parthenocissus quinquefolia* (Virginia creeper), *Phalaris arundinacea* (reed canarygrass), *Pilea pumila* (Canadian clearweed), *Ulmus americana* (American elm)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: The percent cover of *Onoclea sensibilis* (sensitive fern) and *Boehmeria cylindrica* (smallspike false nettle) (CEGL006176) should be greater than *Matteuccia struthiopteris* (ostrich fern) and *Laportea canadensis* (Canadian woodnettle) (CEGL006147).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.1, SARA.2, SARA.119, SARA.152, SARA.156, SARA.160, SARA.161, SARA.163, SARA.164, SARA.165, SARA.175, SARA.176

Accuracy Assessment Observations: SARA.122 (AA), SARA.124 (AA), SARA.146 (AA), SARA.188 (AA), SARA.190 (AA), SARA.195 (AA), SARA.205 (AA), SARA.221 (AA), SARA.249 (AA), SARA.250 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance*	*Acer (rubrum, saccharinum) - Ulmus americana* Temporarily Flooded Forest Alliance (A.299)
Alliance (English name)*	(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance
Association	*Acer saccharinum / Onoclea sensibilis - Boehmeria cylindrica* Forest
Association (English name)	Silver Maple / Sensitive Fern - Small-spike False Nettle Forest
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587)

Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: These silver maple floodplain forests of the northeastern United States are typical of riverbottoms, lakeplains, and the inner floodplain of medium to large rivers, mostly at less than 245 m (800 feet) elevation. They are most typical of third- and fourth-order rivers. They are subjected to spring flooding of high frequency and duration; their soils are poorly drained and deep. They are generally associated with calcareous or sedimentary bedrock and with fine-grained surficial deposits but may occur in coarser soils or tills. The canopy ranges from closed to somewhat open (in small inclusions, it may be quite sparse) and is high and arching. Shrubs are few; the herb layer is very well-developed. Bryoids are minor. The overall effect is of tall, well-spaced trees over a lush carpet of herbs. The canopy is strongly dominated by *Acer saccharinum* (silver maple). Associated trees include *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm), and occasionally *Quercus bicolor* (swamp white oak) or *Quercus macrocarpa* (bur oak). *Prunus serotina* (black cherry), *Picea glauca* (white spruce), and *Acer rubrum* (red maple) have been occasionally noted northward. The herb layer is seasonally variable, with spring ephemerals succeeded by dense cover of mixed ferns, forbs and graminoids. Summer-dominant herbs include *Onoclea sensibilis* (sensitive fern) and *Boehmeria cylindrica* (smallspike false nettle). This type differs from *Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis* Forest (CEGL006147) in its somewhat more poorly drained soils, longer flood duration, and the reduced importance of *Matteuccia struthiopteris* (ostrich fern) relative to *Onoclea sensibilis* (sensitive fern) along with generally higher herb layer richness. It generally lacks *Populus deltoides* (eastern cottonwood) and *Salix nigra* (black willow) in the canopy. It may be bordered on its upland edge by terrace forests dominated by *Acer saccharum* (sugar maple).

Environmental Description: These silver maple floodplain forests of the northeastern United States are typical of riverbottoms, lakeplains, and the inner floodplain of medium to large rivers, mostly at less than 800 feet elevation. They are most typical of third- and fourth-order rivers. They are subjected to spring flooding of high frequency and duration; their soils are poorly drained and deep. They are generally associated with calcareous or sedimentary bedrock and with fine-grained surficial deposits, but may occur in coarser soils or tills.

Vegetation Description: The canopy ranges from closed to somewhat open and is high and arching. Shrubs are few; the herb layer is very well-developed. Bryoids are minor. The overall effect is of tall, well-spaced trees over a lush carpet of herbs. The canopy is strongly dominated by *Acer saccharinum* (silver maple). Associated trees include *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm), and occasionally *Quercus bicolor* (swamp white oak) or *Quercus macrocarpa* (bur oak). *Prunus serotina* (black cherry), *Picea glauca* (white spruce), and *Acer rubrum* (red maple) have been occasionally noted northward. The herb layer is seasonally variable, with spring ephemerals, including *Erythronium americanum* (dogtooth violet), *Sanguinaria canadensis* (bloodroot), and *Arisaema triphyllum* (Jack in the pulpit), succeeded by dense cover of mixed ferns, forbs and graminoids. Summer-dominant herbs include *Onoclea sensibilis* (sensitive fern) and *Boehmeria cylindrica* (smallspike false nettle). *Matteuccia struthiopteris* (ostrich fern) and *Laportea canadensis*

(Canadian woodnettle) may be present but are not abundant; other typical species include *Pilea pumila* (Canadian clearweed), *Lycopus uniflorus* (northern bugleweed), *Scutellaria lateriflora* (blue skullcap), *Thelypteris palustris* (eastern marsh fern), *Osmunda regalis* (royal fern), *Thalictrum pubescens* (king of the meadow), *Bidens tripartita* (threelobe beggarticks), *Ludwigia palustris* (marsh seedbox), *Calamagrostis canadensis* (bluejoint), and *Cinna* (woodreed) spp. In more disturbed sites, non-native herbs such as *Lysimachia nummularia* (creeping jenny) and *Lythrum salicaria* (purple loosestrife) may be common.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharinum* (silver maple)
Herb (field)	Forb	*Boehmeria cylindrica* (smallspike false nettle)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Acer saccharinum* (silver maple), *Boehmeria cylindrica* (smallspike false nettle)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Information not available.

States/Provinces: CT, MA, ME:S3, NB, NH, NJ?, NY, VT

Federal Lands: NPS (Minute Man, Saratoga); USFWS (Carlton Pond?, Great Meadows?, Moosehorn?, Oxbow)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis Forest (CEGL006147)

Acer saccharinum Temporarily Flooded Forest [Placeholder] (CEGL007304)

Related Concepts:

Acer saccharinum/Boehmeria-Onoclea, Type 3 (Sperduto and Crowley 2002a) ?

Lakeside Floodplain Forest (Thompson 1996) ?

Lakeside/large riverbottom floodplain forest (NAP pers. comm. 1998) ?

Palustrine Broad-leaved Deciduous Forested Wetland, Seasonally Flooded (PFO1C) (Cowardin et al. 1979) ?

Riverine Floodplain Forest (Thompson 1996) B

Silver Maple - American Elm: 62 (Eyre 1980) B
Southern New England floodplain forest (Rawinski 1984) ?

SOURCES

Description Authors: S.C. Gawler

References: Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Eyre 1980, Fike 1999, Gawler 2002, Metzler 1984, Metzler and Barrett 2001, NAP pers. comm. 1998, NRCS 2004, Rawinski 1984, Sperduto 2000b, Sperduto and Crowley 2002a, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Jenkins 1992, Thompson and Sorenson 2000



Figure F-25. Silver Maple / Sensitive Fern Floodplain Forest in the Saratoga Battlefield Unit (plot SARA.2, NYNHP B1, photo no. 3). 6/17/2003. NAD 1983 / UTM easting 611664, northing 4758762.

Local Name: Silver Maple Floodplain Levee Forest (CEGL006147)

SYNONYMS

USNVC English Name:	**Silver Maple - (Eastern Cottonwood) / Ostrich Fern - Canadian Wood-nettle Forest**
USNVC Scientific Name:	***Acer saccharinum* - *(Populus deltoides) / Matteuccia struthiopteris* - *Laportea canadensis* Forest**
USNVC Identifier:	**CEGL006147**

LOCAL INFORMATION

Environmental Description: This temporarily flooded forest occurs between 27 and 34 m (90-110 feet) on the broad, level floodplain of the Hudson River. The soil is very deep, poorly drained to somewhat excessively drained gravelly sandy loam and silt loam in the Hoosic, Limerick-Saco complex, and Teel series (NRCS 2004). Underlying bedrock is siltstone and shale in the Mt. Merino Formation. Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176) lies to the east of this association, closer to the Hudson; additional adjacent communities are Northeastern Old Field (CEGL006107) and Northeastern Successional Shrubland (CEGL006451).

Vegetation Description: This floodplain forest is dominated by *Populus deltoides* (eastern cottonwood) with canopy associates that include *Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash), *Carya cordiformis* (bitternut hickory), *Platanus occidentalis* (American sycamore), and *Quercus bicolor* (swamp white oak). Canopy trees extend to over 25 m tall and have 70-75% cover. The subcanopy, which is nearly 15 m tall with greater than 40% cover, is codominated by *Acer saccharinum* (silver maple), *Acer negundo* (box-elder), and *Ulmus americana* (American elm) with lesser amounts of *Fraxinus pennsylvanica* (green ash), *Carya cordiformis* (bitternut hickory), *Prunus serotina* (black cherry), *Ailanthus altissima* (tree of heaven), *Tilia americana* (American basswood), and *Morus alba* (white mulberry). The tall-shrub layer, with 30-35% cover, is dominated by *Lonicera tatarica* (Tatarian honeysuckle) with *Fraxinus pennsylvanica* (green ash), *Robinia pseudoacacia* (black locust), *Rhamnus cathartica* (common buckthorn), and *Acer negundo* (box-elder) as associates. Most of the same species occur in the short-shrub layer, which has 40-45% cover; additional species are *Berberis thunbergii* (Japanese barberry) and *Rubus allegheniensis* (Allegheny blackberry). Common vines are *Parthenocissus quinquefolia* (Virginia creeper), *Vitis riparia* (riverbank grape), and *Toxicodendron radicans* (eastern poison ivy). Herbaceous cover can exceed 50%. Common species are *Dichanthelium clandestinum* (deertongue), *Alliaria petiolata* (garlic mustard), *Pilea pumila* (Canadian clearweed), *Lysimachia nummularia* (creeping jenny), *Boehmeria cylindrica* (smallspike false nettle), *Impatiens capensis* (jewelweed), *Solidago gigantea* (giant goldenrod), and *Ageratina altissima var. altissima* (white snakeroot) with associates that include *Onoclea sensibilis* (sensitive fern), *Glechoma hederacea* (ground ivy), *Athyrium filix-femina* (common ladyfern), *Teucrium canadense* (Canada germander), *Arisaema triphyllum* (Jack in the pulpit), *Ranunculus parviflorus* (smallflower buttercup), *Galium palustre*

(common marsh bedstraw), *Eupatorium maculatum* (spotted joepyeweed), *Viola cucullata* (marsh blue violet), and others.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Populus deltoides* (eastern cottonwood)
Tree subcanopy	Broad-leaved deciduous tree	*Acer negundo* (box-elder), *Acer saccharinum* (silver maple), *Ulmus americana* (American elm)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard), *Boehmeria cylindrica* (smallspike false nettle), *Impatiens capensis* (jewelweed), *Lysimachia nummularia* (creeping jenny), *Pilea pumila* (Canadian clearweed)
Herb (field)	Graminoid	*Dichanthelium clandestinum* (deertongue)

Characteristic Species: *Acer negundo* (box-elder), *Acer saccharinum* (silver maple), *Ageratina altissima* var. *altissima* (white snakeroot), *Alliaria petiolata* (garlic mustard), *Dichanthelium clandestinum* (deertongue), *Fraxinus pennsylvanica* (green ash), *Onoclea sensibilis* (sensitive fern), *Parthenocissus quinquefolia* (Virginia creeper), *Populus deltoides* (eastern cottonwood), *Teucrium canadense* (Canada germander), *Ulmus rubra* (slippery elm)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This association is located in the Schuyler House parcel in the Old Saratoga Unit of Saratoga National Historical Park.

Classification Comments: The presence of *Populus deltoides* (eastern cottonwood) is helpful in classifying this association, If *Populus* (cottonwood) is lacking, then the percent cover of *Matteuccia struthiopteris* (ostrich fern) and *Laportea canadensis* (Canadian woodnettle) (CEGL006147) should be greater than *Onoclea sensibilis* (sensitive fern) and *Boehmeria cylindrica* (smallspike false nettle) (CEGL006176).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.105, SARA.178

Accuracy Assessment Observations: SARA.242 (AA), SARA.243 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance*	*Acer (rubrum, saccharinum) - Ulmus americana* Temporarily Flooded Forest Alliance (A.299)
Alliance (English name)*	(Red Maple, Silver Maple) - American Elm Temporarily Flooded Forest Alliance
Association	*Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis* Forest
Association (English name)	Silver Maple - (Eastern Cottonwood) / Ostrich Fern - Canadian Wood-nettle Forest
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587) Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: These are silver maple floodplain forests along major rivers in the temperate northeastern United States. They occur on the deep, alluvial, silty to somewhat coarse soils of point bars, levees, and adjacent terraces of medium to large, high-energy and moderate-gradient rivers with heavy erosion and sedimentation, and are subjected to spring flooding. The more-or-less closed canopy is high and arching, and the dominant below-canopy feature is the lush and extensive herb layer, with ferns especially prominent. Shrubs are scattered and the overall shrub cover is low. Bryoids are very minor. The canopy is strongly dominated by *Acer saccharinum* (silver maple). Other trees may be locally common, or scattered, including *Populus deltoides* (eastern cottonwood), *Quercus rubra* (northern red oak), *Acer negundo* (box-elder), *Ulmus rubra* (slippery elm), *Juglans nigra* (black walnut), *Fraxinus americana* (white ash), and *Fraxinus pennsylvanica* (green ash). *Populus deltoides* (eastern cottonwood) tends to be characteristic of the siltier soils and levees within these forests. Typical shrubs include *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Sambucus canadensis* (common elderberry), and potentially invasive non-native *Lonicera* (honeysuckle) spp., *Rosa multiflora* (multiflora rose), or *Ligustrum vulgare* (European privet). Vines such as *Vitis riparia* (riverbank grape) are common at some sites. The dominant herbs are *Matteuccia struthiopteris* (ostrich fern) and *Laportea canadensis* (Canadian woodnettle). Associated herbs include *Elymus riparius* (riverbank wildrye), *Elymus virginicus* (Virginia wildrye), *Amphicarpaea bracteata* (American hogpeanut), *Ageratina altissima* (white snakeroot), *Arisaema triphyllum* (Jack in the pulpit), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Thalictrum pubescens* (king of the meadow), *Onoclea sensibilis* (sensitive fern), and *Polygonum virginianum* (jumpseed).

Particularly in the southern portions of this type's range, non-native herbs such as *Alliaria petiolata* (garlic mustard), *Allium vineale* (wild garlic), *Ranunculus ficaria* (fig buttercup), and *Microstegium vimineum* (Nepalese browntop) may essentially replace the native herbs. This association is distinguished from the related *Acer saccharinum / Onoclea sensibilis - Boehmeria cylindrica* Forest (CEGL006176) by its greater abundance of *Matteuccia struthiopteris* (ostrich fern) relative to *Onoclea sensibilis* (sensitive fern) and its better-drained soils. Flood duration is usually shorter in the ostrich fern type. It is distinguished from floodplain forests to the south by the absence (or only very rare presence) of *Platanus occidentalis* (American sycamore) and *Celtis occidentalis* (common hackberry).

Environmental Description: These are silver maple floodplain forests along major rivers in the temperate northeastern United States. They occur on the deep, alluvial, silty to somewhat coarse soils of point bars, levees, and adjacent terraces of medium to large, high-energy and moderate-gradient rivers with heavy erosion and sedimentation, and are subjected to spring flooding.

Vegetation Description: The more-or-less closed canopy is high and arching, and the dominant below-canopy feature is the lush and extensive herb layer, with ferns especially prominent. Shrubs are scattered and the overall shrub cover is low. Bryoids are very minor. The canopy is strongly dominated by *Acer saccharinum* (silver maple). Other trees may be locally common, or scattered, including *Populus deltoides* (eastern cottonwood), *Quercus rubra* (northern red oak), *Acer negundo* (box-elder), *Ulmus rubra* (slippery elm), *Juglans nigra* (black walnut), *Fraxinus americana* (white ash), and *Fraxinus pennsylvanica* (green ash). *Populus deltoides* (eastern cottonwood) tends to be characteristic of the siltier soils and levees within these forests. Typical shrubs include *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Sambucus canadensis* (common elderberry), and potentially invasive non-native *Lonicera* (honeysuckle) spp., *Rosa multiflora* (multiflora rose), or *Ligustrum vulgare* (European privet). Vines such as *Vitis riparia* (riverbank grape) are common at some sites. The dominant herbs are *Matteuccia struthiopteris* (ostrich fern) and *Laportea canadensis* (Canadian woodnettle). Associated herbs include *Elymus riparius* (riverbank wildrye), *Elymus virginicus* (Virginia wildrye), *Amphicarpaea bracteata* (American hogpeanut), *Ageratina altissima* (white snakeroot), *Arisaema triphyllum* (Jack in the pulpit), *Circaea lutetiana* (broadleaf enchanter's nightshade), *Thalictrum pubescens* (king of the meadow), *Onoclea sensibilis* (sensitive fern), and *Polygonum virginianum* (jumpseed). Particularly in the southern portions of this type's range, non-native herbs such as *Alliaria petiolata* (garlic mustard), *Allium vineale* (wild garlic), *Ranunculus ficaria* (fig buttercup), and *Microstegium vimineum* (Nepalese browntop) may essentially replace the native herbs.

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species:

Species	GRank	Type	Note
Catharus fuscescens (veery)	-	animal	
Icterus galbula (baltimore oriole)	-	animal	
Polioptila caerulea (blue-gray gnatcatcher)	-	animal	

Vireo flavifrons (yellow-throated vireo) - animal
Vireo gilvus (warbling vireo) - animal

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Occurs in the northeastern United States from New Hampshire, Vermont, and New York south to Connecticut and possibly Pennsylvania and Maryland.

States/Provinces: CT, MA, MD?, NH, NJ, NY, PA?, VT

Federal Lands: NPS (Saratoga); USFWS (Great Meadows?)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Two variations in the herb flora have been described (NHNHI 2002). In the ostrich fern variant, *Matteuccia struthiopteris* (ostrich fern) is more abundant than *Laportea canadensis* (Canadian woodnettle), *Ageratina altissima* (white snakeroot), and *Impatiens* (touch-me-not) spp. are often abundant, and *Toxicodendron radicans* (eastern poison ivy) and *Boehmeria cylindrica* (smallspike false nettle) are infrequent. In the wood nettle variant, *Laportea canadensis* (Canadian woodnettle) exceeds *Matteuccia struthiopteris* (ostrich fern) in abundance, and *Toxicodendron radicans* (eastern poison ivy), *Leersia virginica* (whitegrass), *Boehmeria cylindrica* (smallspike false nettle), and *Cinna arundinacea* (sweet woodreed) are more frequent and abundant.

Similar Associations:

Acer saccharinum - Acer negundo / Ageratina altissima - Laportea canadensis - (Elymus virginicus) Forest (CEGL006217)

Acer saccharinum - Ulmus americana Forest (CEGL002586)--midwestern counterpart.

Acer saccharinum / Onoclea sensibilis - Boehmeria cylindrica Forest (CEGL006176)

Acer saccharinum Temporarily Flooded Forest [Placeholder] (CEGL007304)

Acer saccharum - Fraxinus spp. - *Tilia americana / Matteuccia struthiopteris - Ageratina altissima* Forest (CEGL006114)

Platanus occidentalis - Fraxinus pennsylvanica Forest (CEGL006036)

Related Concepts:

Acer saccharinum / Onoclea sensibilis Community, *Matteuccia struthiopteris* variant (Metzler 1984) ?

Acer saccharinum/Matteuccia/Laportea, Type 3 (Sperduto and Crowley 2002a) ?

Palustrine Broad-leaved Deciduous Forested Wetland, Seasonally Flooded (PFO1C) (Cowardin et al. 1979) ?

Riverine Floodplain Forest (Thompson 1996) B

Riverine floodplain forest: medium-gradient stream (NAP pers. comm. 1998) ?

Silver Maple - American Elm: 62 (Eyre 1980) B

Southern New England floodplain forest (Rawinski 1984) ?

SOURCES

Description Authors: S.C. Gawler

References: Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Enser 1993, Eyre 1980, Gawler 2002, Metzler 1984, Metzler and Barrett 1982, Metzler and Barrett 2001, Metzler and Barrett 2004, Metzler and Damman 1985, NAP pers. comm. 1998, NRCS 2004, Overlease 1987, Rawinski 1984, Sperduto 2000b, Sperduto and Crowley 2002a, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-26. Silver Maple Floodplain Levee Forest in the Saratoga Battlefield Unit (plot SARA.105, NYNHP SF5, photo no. 559). 7/21/2004. NAD 1983 / UTM easting 612244, northing 4759066.

Local Name: Terrace Hardwood Floodplain Forest (CEGL006114)

SYNONYMS

USNVC English Name: **Sugar Maple - Ash species - American Basswood / Ostrich Fern - White Snakeroot Forest**

USNVC Scientific Name: ***Acer saccharum* - *Fraxinus* spp. - *Tilia americana / Matteuccia struthiopteris* - *Ageratina altissima* Forest**

USNVC Identifier: **CEGL006114**

LOCAL INFORMATION

Environmental Description: This floodplain forest is located on the gently sloping banks of Fish Creek at elevations ranging from 30 to 52 m (100-170 feet). Generally, it is just upslope from a reservoir and is surrounded by residential developments. Soil is shallow to very deep, well- to somewhat excessively drained silt loam and channery silt loam in the Bernardston-Manlius-Nassau complex and Manlius-Nassau complex (NRCS 2004). Underlying bedrock is shale and siltstone in the Mt. Merino Formation.

Vegetation Description: The tree canopy of this floodplain forest is closed to somewhat open, and unlike lower-elevation floodplain forests, a subcanopy is present. The canopy, which is 20-25 m tall with 75% cover, is dominated by *Acer saccharum* (sugar maple) with *Prunus serotina* (black cherry) nearly a codominant. *Fraxinus americana* (white ash), *Quercus rubra* (northern red oak), and *Acer rubrum* (red maple) are present in lesser amounts. *Ulmus americana* (American elm) is dominant in the subcanopy (10 m tall, 20% cover) with *Fraxinus americana* (white ash) and *Acer saccharum* (sugar maple) as associated species. Tall shrubs consist mainly of *Lonicera tatarica* (Tatarian honeysuckle), present with 25% cover. Low shrubs, with 50% cover, are also dominated by *Lonicera tatarica* (Tatarian honeysuckle) with *Ulmus americana* (American elm), *Viburnum acerifolium* (mapleleaf viburnum), *Prunus serotina* (black cherry), and *Acer saccharum* (sugar maple). With 20% cover, *Parthenocissus quinquefolia* (Virginia creeper) is a fairly abundant vine. The herbaceous layer, with 85% cover, is strongly dominated by the invasive exotic *Alliaria petiolata* (garlic mustard) with significantly lesser amounts of *Impatiens capensis* (jewelweed), *Hackelia virginiana* (beggarslice), *Athyrium filix-femina* (common ladyfern), *Maianthemum racemosum* (feathery false lily of the valley), *Geum canadense* (white avens), and *Circaea lutetiana* (broadleaf enchanter's nightshade).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer saccharum* (sugar maple), *Prunus serotina* (black cherry)
Tree subcanopy	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Short shrub/sapling	Broad-leaved deciduous shrub	*Ulmus americana* (American elm)

Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Alliaria petiolata* (garlic mustard)

Characteristic Species: *Acer saccharum* (sugar maple), *Alliaria petiolata* (garlic mustard), *Athyrium filix-femina* (common ladyfern), *Fraxinus americana* (white ash), *Impatiens capensis* (jewelweed), *Lonicera tatarica* (Tatarian honeysuckle), *Parthenocissus quinquefolia* (Virginia creeper), *Prunus serotina* (black cherry), *Quercus rubra* (northern red oak), *Ulmus americana* (American elm)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: At Saratoga National Historical Park, this community is located on the floodplain of Fish Creek both in the Old Saratoga Unit (in the Schuyler House parcel) and in the mapped area outside the park boundary.
Classification Comments: This association was used exclusively to classify very seldomly flooded floodplain forests on terraces.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.182
Accuracy Assessment Observations: None
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Floodplain Forest and Scrub (M029)
Group	Silver Maple – Green Ash – Sycamore Floodplain Group (G040)
Alliance*	*Acer saccharum* - *Carya cordiformis* Temporarily Flooded Forest Alliance (A.302)
Alliance (English name)*	Sugar Maple - Bitternut Hickory Temporarily Flooded Forest Alliance
Association	*Acer saccharum* - *Fraxinus* spp. - *Tilia americana / Matteuccia struthiopteris* - *Ageratina altissima* Forest
Association (English name)	Sugar Maple - Ash species - American Basswood / Ostrich Fern - White Snakeroot Forest
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587) Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: These rich floodplain forests are found on slightly elevated alluvial terraces and active floodplains of larger rivers throughout the glaciated Northeast. The setting is a raised river terrace; however, this forest may occur very close to the riverbank, if the water channel is well-entrenched, and may even be on sloping banks along some river reaches. The alluvial soils are coarse and less regularly inundated than the soils supporting silver maple floodplain forests. Many of our examples occur on circumneutral to slightly calcareous soils. The canopy is closed to somewhat open, and unlike lower elevation floodplain forests, a subcanopy is often present. Shrubs are occasional but do not form high cover. The herb layer is well-developed and seasonally variable, with spring ephemerals giving way to taller ferns, graminoids and forbs. Bryoids are very minor. The canopy dominants can vary from site to site but are usually some combination of *Acer saccharum* (sugar maple), *Tilia americana* (American basswood), *Quercus rubra* (northern red oak), *Ulmus americana* (American elm), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), and *Prunus serotina* (black cherry). Minor canopy associates include *Acer saccharinum* (silver maple), *Juglans cinerea* (butternut), *Fraxinus nigra* (black ash), and *Acer rubrum* (red maple). Shrubs include *Corylus americana* (American hazelnut), *Viburnum lentago* (nannyberry), and *Prunus virginiana* (chokecherry); vines, such as *Toxicodendron radicans* (eastern poison ivy), *Parthenocissus* (creeper) spp., or *Vitis* (grape) spp., may be locally common. The herb layer usually features *Matteuccia struthiopteris* (ostrich fern) and a mixture of other ferns, forbs and graminoids. Characteristic species include *Ageratina altissima* (white snakeroot), *Allium tricoccum* (wild leek), *Allium canadense* (meadow garlic), *Athyrium filix-femina* (common ladyfern), *Caulophyllum thalictroides* (blue cohosh), *Carex gracillima* (graceful sedge), *Carex intumescens* (greater bladder sedge), *Carex sprengelii* (Sprengel's sedge), *Deparia acrostichoides* (silver false spleenwort), *Elymus virginicus* (Virginia wildrye), *Elymus riparius* (riverbank wildrye), *Elymus wiegandii* (Wiegand's wildrye), *Onoclea sensibilis* (sensitive fern), *Sanguinaria canadensis* (bloodroot), *Solidago flexicaulis* (zigzag goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), and *Solidago gigantea* (giant goldenrod), in addition to abundant spring ephemerals in the early growing season. Exotic species, such as *Lysimachia nummularia* (creeping jenny), *Glechoma hederacea* (ground ivy), and *Hesperis matronalis* (dames rocket), may be abundant, especially in disturbed areas. These terrace forests are distinguished from lower floodplain forests by the reduced importance of *Acer saccharinum* (silver maple); they differ from enriched northern hardwood forests, e.g., *Acer saccharum - Fraxinus americana - Tilia americana / Acer spicatum / Caulophyllum thalictroides* Forest (CEGL005008), in their alluvial soils and flooding regime; also, *Matteuccia struthiopteris* (ostrich fern) is generally not found in enriched northern hardwood forests.

Environmental Description: These rich floodplain forests are found on slightly elevated alluvial terraces as well as active floodplains of larger rivers throughout the glaciated Northeast. The setting is a raised river terrace; however, this forest may occur very close to the riverbank if the water channel is well entrenched, and may even be on sloping banks along some river reaches. The alluvial soils are coarse and less regularly inundated than the soils supporting silver maple floodplain forests. Many of our examples occur on circumneutral to slightly calcareous soils.

Vegetation Description: The canopy is closed to somewhat open, and unlike lower-elevation floodplain forests, a subcanopy is often present. Shrubs are occasional, but do not form high cover. The herb layer is well-developed and seasonally variable, with spring ephemerals giving way to taller ferns, graminoids, and forbs. Bryoids are very minor. The canopy dominants can vary from site to site, but are usually some combination of *Acer saccharum* (sugar maple), *Tilia americana* (American basswood), *Quercus rubra* (northern red oak), *Ulmus americana* (American elm), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), and *Prunus serotina* (black cherry). Minor canopy associates include *Acer saccharinum* (silver maple), *Juglans cinerea* (butternut), *Fraxinus nigra* (black ash), and *Acer rubrum* (red maple). Shrubs include *Corylus americana* (American hazelnut), *Viburnum lentago* (nannyberry), and *Prunus virginiana* (chokecherry); vines such as *Toxicodendron radicans* (eastern poison ivy), *Parthenocissus* (creeper) spp., or *Vitis* (grape) spp. may be locally common. The herb layer usually features *Matteuccia struthiopteris* (ostrich fern) and a mixture of other ferns, forbs, and graminoids. Characteristic species include *Ageratina altissima* (white snakeroot), *Allium tricoccum* (wild leek), *Allium canadense* (meadow garlic), *Athyrium filix-femina* (common ladyfern), *Caulophyllum thalictroides* (blue cohosh), *Carex gracillima* (graceful sedge), *Carex intumescens* (greater bladder sedge), *Carex sprengelii* (Sprengel's sedge), *Deparia acrostichoides* (silver false spleenwort), *Elymus virginicus* (Virginia wildrye), *Elymus riparius* (riverbank wildrye), *Elymus wiegandii* (Wiegand's wildrye), *Onoclea sensibilis* (sensitive fern), *Sanguinaria canadensis* (bloodroot), *Solidago flexicaulis* (zigzag goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), and *Solidago gigantea* (giant goldenrod) in addition to abundant spring ephemerals in the early growing season. Exotic species, such as *Lysimachia nummularia* (creeping jenny), *Glechoma hederacea* (ground ivy), and *Hesperis matronalis* (dames rocket), may be abundant, especially in disturbed areas.

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species:

Species	GRank	Type	Note
Castor canadensis (american beaver)	-	animal	
Catharus fuscescens (veery)	-	animal	
Icterus galbula (baltimore oriole)	-	animal	
Ondatra zibethicus (common muskrat)	-	animal	
Polioptila caerulea (blue-gray gnatcatcher)	-	animal	
Vireo flavifrons (yellow-throated vireo)	-	animal	
Vireo gilvus (warbling vireo)	-	animal	

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Information not available.

States/Provinces: CT, MA:S2, MD, ME, NB, NH, NJ:S2S3, NY, VT

Federal Lands: NPS (Saratoga)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Drastically reduced from original extent, as most make excellent fertile farmland. Originally probably a large patch type; now small patch.

Similar Associations:

Acer saccharinum - (Populus deltoides) / Matteuccia struthiopteris - Laportea canadensis Forest (CEGL006147)

Acer saccharum - Fraxinus americana / Carpinus caroliniana / Podophyllum peltatum Forest (CEGL006459)

Acer saccharum - Juglans cinerea / Carpinus caroliniana / Matteuccia struthiopteris Forest (CEGL006430)

Liriodendron tulipifera - Fraxinus spp. / *Lindera benzoin - Viburnum prunifolium / Podophyllum peltatum* Forest (CEGL006314)

Tilia americana - Acer saccharum - Acer nigrum / Laportea canadensis Forest (CEGL006405)

Related Concepts:

Acer saccharum-Acer saccharinum-Fraxinus americana variant, Type 5 (Sperduto and Crowley 2002a) ?

Floodplain Forest (Breden 1989) B

Palustrine Broad-leaved Deciduous Forested Wetland, Seasonally Flooded (PFO1C) (Cowardin et al. 1979) ?

Riverine Floodplain Forest (Thompson 1996) ?

Riverine floodplain forest: terraces (NAP pers. comm. 1998) ?

SNE Riverside/streamside mesic, deciduous forest (Rawinski 1984) ?

Sugar Maple - Basswood: 26 (Eyre 1980) B

SOURCES

Description Authors: S.C. Gawler

References: Breden 1989, Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Eyre 1980, Gawler 2002, Harrison 2004, Harrison and Stango 2003, Metzler and Barrett 2001, NAP pers. comm. 1998, NRCS 2004, Rawinski 1984, Sperduto 2000a, Sperduto 2000b, Sperduto and Crowley 2002a, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000

Local Name: Elm - Ash / Skunk Cabbage Swamp (CEGL006966)

SYNONYMS

USNVC English Name: **Slippery Elm - Green Ash - Yellow Birch / Silky Dogwood / Skunk-cabbage Forest**

USNVC Scientific Name: ***Ulmus rubra - Fraxinus pennsylvanica - Betula alleghaniensis / Cornus amomum / Symplocarpus foetidus* Forest**

USNVC Identifier: **CEGL006966**

LOCAL INFORMATION

Environmental Description: This seasonally flooded forest occurs in two patches at Saratoga: one in a moderately steep, east/southeast-facing drainage between 46 and 55 m (150-180 feet) in elevation, and the other in a linear basin at 106 m (347 feet) just east of the Freeman Farm Overlook. Soil is very deep, moderately well-drained to poorly drained silt loam in the Hudson and Sun series (NRCS 2004); underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. The patch on the overlook hill is surrounded by Early-Successional Woodland/Forest (CEGL006303). The low-elevation patch, just west of Bemis Heights, is bounded on the west, south, and southeast by cropland and pasture; Northeastern Successional Shrubland (CEGL006451) is on its northwest corner; and Eastern Cattail Marsh (CEGL006153) makes up its northern and northeastern boundary.

Vegetation Description: The tree canopy, subcanopy, and tall-shrub layers of this association are all dominated by *Fraxinus pennsylvanica* (green ash). The canopy reaches almost 25 m tall and is open, with 50-55% cover; the subcanopy (10 m tall) and tall-shrub (3 m tall) layers are sparse, with 20-25% cover and 15-20% cover, respectively. The short-shrub layer has 10-15% cover and is dominated by *Cornus amomum* (silky dogwood) with *Fraxinus pennsylvanica* (green ash). Herbaceous cover reaches 70% and is dominated by *Phalaris arundinacea* (reed canarygrass) and *Carex lupulina* (hop sedge) with *Scirpus cyperinus* (woolgrass), *Glyceria striata* (fowl mannagrass), *Bidens frondosa* (devil's beggartick), *Boehmeria cylindrica* (smallspike false nettle), *Leersia oryzoides* (rice cutgrass), *Carex lurida* (shallow sedge), *Onoclea sensibilis* (sensitive fern), *Scutellaria lateriflora* (blue skullcap), and *Alisma subcordatum* (American water plantain). The floating aquatic species *Spirodela polyrrhiza* (common duckmeat) is present at nearly 40% cover.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Fraxinus pennsylvanica* (green ash)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood)
Herb (field)	Graminoid	*Carex lupulina* (hop sedge), *Phalaris arundinacea* (reed canarygrass)

Characteristic Species: *Carex lupulina* (hop sedge), *Cornus amomum* (silky dogwood), *Fraxinus pennsylvanica* (green ash), *Phalaris arundinacea* (reed canarygrass), *Viburnum dentatum* (southern arrowwood)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4S5*	B	1	Red maple-hardwood swamp	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.
Classification Comments: This association was used exclusively to classify *Fraxinus pennsylvanica* (green ash)-dominated basin swamps, despite lacking *Ulmus rubra* (slippery elm) and other associated species.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.28
Accuracy Assessment Observations: SARA.141 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Swamp Forest (M030)
Group	Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)
Alliance*	*Acer rubrum - Fraxinus pennsylvanica* Seasonally Flooded Forest Alliance (A.316)
Alliance (English name)*	Red Maple - Green Ash Seasonally Flooded Forest Alliance
Association	*Ulmus rubra - Fraxinus pennsylvanica - Betula alleghaniensis / Cornus amomum / Symplocarpus foetidus* Forest
Association (English name)	Slippery Elm - Green Ash - Yellow Birch / Silky Dogwood / Skunk Cabbage Forest
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: Seasonally flooded northern hardwood forest with *Acer rubrum* (red maple), *Fraxinus pennsylvanica* (green ash), *Betula alleghaniensis* (yellow birch), and *Ulmus rubra* (slippery elm) as canopy species. Shrub species include *Cornus amomum* (silky dogwood), *Alnus serrulata* (hazel alder), and *Rosa palustris* (swamp rose). Herbs include *Agrimonia parviflora* (harvestlice), *Carex stricta* (upright sedge), *Mimulus ringens* (Allegheny monkeyflower), *Onoclea sensibilis*

(sensitive fern), *Scirpus atrovirens* (green bulrush), *Euthamia graminifolia var. graminifolia* (flat-top goldentop), and *Symplocarpus foetidus* (skunk cabbage).
Environmental Description: Information not available.
Vegetation Description: Information not available.
Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: Palustrine
DISTRIBUTION
Range: Information not available.
States/Provinces: NJ, NY
Federal Lands: NPS (Saratoga)
CONSERVATION STATUS
Rank: GNR (8-Nov-2000)
Reasons: Information not available.
CLASSIFICATION INFORMATION
Status: Nonstandard
Confidence: Information not available.
Comments: Description based on FWW site (0282-K). Differential species include *Betula alleghaniensis* (yellow birch), *Cornus amomum* (silky dogwood), and *Alnus serrulata* (hazel alder).
Similar Associations: Information not available.
Related Concepts: Information not available.
SOURCES
Description Authors: Missing information
References: Eastern Ecology Working Group n.d.



Figure F-27. Elm - Ash / Skunk Cabbage Swamp in the Saratoga Battlefield Unit (AA point SARA.141, NYNHP 291). 7/13/2006. NAD 1983 / UTM easting 610189, northing 4762392.

Local Name: Red Maple - Lake Sedge Wooded Marsh (CEGL006105)

SYNONYMS

USNVC English Name: Red Maple / Lake Sedge Woodland
USNVC Scientific Name: *Acer rubrum / Carex lacustris* Woodland
USNVC Identifier: CEGL006105

LOCAL INFORMATION

Environmental Description: This woodland association is located at 70 m (230 feet) in elevation on very deep, moderately well-drained, loamy fine sand in the Oakville series (NRCS 2004); underlying bedrock is shale and sandstone in the Canajoharie Formation. It is located just south of Southern New England Red Maple Seepage Swamp (CEGL006406), with Upland/Wetland Transitional Forest (CEGL006000) bounding it on the east and Northeastern Oak - Red Maple Successional Forest (CEGL006506) on the west and south.

Vegetation Description: The open tree canopy (35% cover) and subcanopy (25%) layers of this woodland association are dominated by *Acer rubrum* (red maple) with lesser amounts of *Populus tremuloides* (quaking aspen), *Fraxinus pennsylvanica* (green ash), and *Betula populifolia* (gray birch). *Lyonia ligustrina* (maleberry) is the most abundant tall shrub, with 30% cover; short shrubs, also with 30% cover, are dominated by *Spiraea alba* var. *latifolia* (white meadowsweet) with *Lyonia ligustrina* (maleberry) and *Cornus amomum* (silky dogwood). Herbaceous species are somewhat dense, with 60% cover; *Carex* (sedge) cf. *lacustris* is dominant with associated *Thelypteris palustris* (eastern marsh fern).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Populus tremuloides* (quaking aspen)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Lyonia ligustrina* (maleberry)
Short shrub/sapling	Broad-leaved deciduous shrub	*Spiraea alba* var. *latifolia* (white meadowsweet)
Herb (field)	Graminoid	*Carex lacustris* (lake sedge)
Herb (field)	Fern or fern ally	*Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Acer rubrum* (red maple), *Carex lacustris* (lake sedge), *Lyonia ligustrina* (maleberry), *Spiraea alba* var. *latifolia* (white meadowsweet), *Thelypteris palustris* (eastern marsh fern)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4S5*	B	1	Red maple-hardwood swamp	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.
Other Comments: *Carex lacustris* (lake sedge) was tentatively identified from digital photos and may not be the actual species; thus, this polygon may not represent this association.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: None
Accuracy Assessment Observations: SARA.204 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Swamp Forest (M030)
Group	Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)
Alliance*	*Acer rubrum* Seasonally Flooded Woodland Alliance (A.653)
Alliance (English name)*	Red Maple Seasonally Flooded Woodland Alliance
Association	*Acer rubrum / Carex lacustris* Woodland
Association (English name)	Red Maple / Lake Sedge Woodland
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: Red maple swamps occurring in somewhat enriched conditions in central and southern New England. Enrichment is derived from groundwater seepage through calcareous bedrock or marine silts. Soils are seasonally saturated and vary in texture from muck to silt loam covered with organic matter or sometimes peat. *Acer rubrum* (red maple) is dominant in a somewhat open canopy. The shrub layer is generally sparse and includes *Alnus incana ssp. rugosa* (speckled alder), *Viburnum lentago* (nannyberry), and *Acer rubrum* (red maple). The herbaceous layer is characterized by tall, dense patches of *Carex lacustris* (lake sedge). Other common herbaceous species include *Onoclea sensibilis* (sensitive fern), *Eupatorium dubium* (coastalplain joepyeweed), *Impatiens capensis* (jewelweed), *Campanula aparinoides* (marsh bellflower), *Lysimachia ciliata* (fringed loosestrife), and *Carex stricta* (upright sedge). Diagnostic features are dense *Carex lacustris* (lake sedge) beneath an open canopy of *Acer rubrum* (red maple).
Environmental Description: Soils are seasonally saturated and vary in texture from muck to silt loam covered with organic matter or sometimes peat.
Vegetation Description: *Acer rubrum* (red maple) is dominant in a somewhat open canopy. The shrub layer is generally sparse and includes *Alnus incana ssp. rugosa* (speckled alder), *Viburnum lentago* (nannyberry), and *Acer rubrum* (red maple). The herbaceous layer is characterized by tall, dense patches of *Carex lacustris* (lake sedge). Other common herbaceous species include *Onoclea sensibilis* (sensitive fern), *Eupatorium dubium* (coastalplain joepyeweed), *Impatiens capensis* (jewelweed), *Campanula aparinoides* (marsh bellflower), *Lysimachia ciliata* (fringed loosestrife), and *Carex stricta* (upright sedge).

Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable
DISTRIBUTION
Range: Central and southern New England.
States/Provinces: CT, MA?, NH, NY
Federal Lands: NPS (Saratoga)
CONSERVATION STATUS
Rank: GNR (21-Apr-2004)
Reasons: Information not available.
CLASSIFICATION INFORMATION
Status: Standard
Confidence: 3 - Weak
Comments: Information not available.
Similar Associations:
Acer rubrum / Carex stricta - Onoclea sensibilis Woodland (CEGL006119)
Related Concepts: Information not available.
SOURCES
Description Authors: S.L. Neid
References: Eastern Ecology Working Group n.d., Metzler and Barrett 2001, Metzler and Barrett 2003, NRCS 2004, Sperduto 2000a, Sperduto and Nichols 2004



Figure F-28. Red Maple - Lake Sedge Wooded Marsh in the Saratoga Battlefield Unit (AA point SARA.204, NYNHP 398). 9/20/2006. NAD 1983 / UTM easting 612041, northing 4762353.

Local Name: Southern New England Red Maple Seepage Swamp (CEGL006406)

SYNONYMS

USNVC English Name:	**Red Maple - (Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest**
USNVC Scientific Name:	***Acer rubrum - Fraxinus (pennsylvanica, americana) / Lindera benzoin / Symplocarpus foetidus* Forest**
USNVC Identifier:	**CEGL006406**

LOCAL INFORMATION

Environmental Description: This seepage swamp occurs in small, saturated pockets on gently sloping hillsides, along small streams, or in depressions that receive overland flooding in addition to groundwater influence. Elevations range from 27 to 137 m (90-450 feet). At Saratoga, this community has developed on soils that are very deep and well-drained to very poorly drained, composed of mucky silty clay loam, silt loam, channery silt loam, loamy sand, and loamy fine sand, and are in the Madalin, Sun, Hudson, Wareham, Manlius-Nassau complex, Rhinebeck, Limerick-Saco complex, Nassau-Rock outcrop complex, Bernardston-Manlius-Nassau complex, Bernardston series (NRCS 2004). The underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. This swamp is commonly found adjacent to patches of Eastern Cattail Marsh (CEGL006153), croplands, and upland forests that include Northeastern Oak - Red Maple Successional Forest (CEGL006506), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), White Pine - Oak Forest (CEGL006293), and Northern Red Oak - Northern Hardwood Forest (CEGL006173).

Vegetation Description: The tree canopy of this palustrine forest association is strongly dominated by *Acer rubrum* (red maple) with scattered individuals of *Ulmus americana* (American elm). Canopy trees are 20-25 m tall with 70-75% cover. *Fraxinus pennsylvanica* (green ash) and *Ulmus americana* (American elm) share dominance in the subcanopy, which is 15 m tall and has 35% cover. Tall shrubs are somewhat abundant, with 25-30% cover, and are dominated by *Vaccinium corymbosum* (highbush blueberry) with *Fraxinus pennsylvanica* (green ash), *Lonicera tatarica* (Tatarian honeysuckle), and *Ulmus americana* (American elm). Short shrubs are equally abundant and are dominated by *Spiraea alba* var. *latifolia* (white meadowsweet) with associated species that are found in the tall-shrub layer. Herbaceous species have 25% cover and are codominated by the ferns *Onoclea sensibilis* (sensitive fern) and *Osmunda cinnamomea* (cinnamon fern) with lesser amounts of *Osmunda regalis* (royal fern) and *Symplocarpus foetidus* (skunk cabbage).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tree subcanopy	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm)

Tall shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium corymbosum* (highbush blueberry)
Short shrub/sapling	Broad-leaved deciduous shrub	*Spiraea alba* var. *latifolia* (white meadowsweet)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern)

Characteristic Species: *Acer rubrum* (red maple), *Fraxinus pennsylvanica* (green ash), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern), *Spiraea alba* var. *latifolia* (white meadowsweet), *Symplocarpus foetidus* (skunk cabbage), *Ulmus americana* (American elm), *Vaccinium corymbosum* (highbush blueberry)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4S5*	B	1	Red maple-hardwood swamp	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: None

Reference Observations: SARA.241, SARA.251

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Swamp Forest (M030)
Group	Northern and Central Conifer and Hardwood Acidic Swamp Group (G045)
Alliance*	*Acer rubrum - Fraxinus pennsylvanica* Saturated Forest Alliance (A.3035)
Alliance (English name)*	Red Maple - Green Ash Saturated Forest Alliance
Association	*Acer rubrum - Fraxinus (pennsylvanica, americana) / Lindera benzoin / Symplocarpus foetidus* Forest
Association (English name)	Red Maple - (Green Ash, White Ash) / Northern Spicebush / Skunk-cabbage Forest
Ecological System(s)	North-Central Appalachian Acidic Swamp (CES202.604) Central Appalachian Stream and Riparian (CES202.609)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association is a seepage swamp dominated by *Acer rubrum* (red maple) and ranging from southern New England to Virginia. It generally occurs in saturated situations on

slightly sloping hillsides, along small streams, or in basins that receive overland flooding in addition to groundwater influence. In general, these swamps are moderately acidic to moderately basic and have some seepage indicators but are not particularly species-rich. Soils are shallow to moderately deep mucks over mineral soils. *Acer rubrum* (red maple) dominates the canopy; *Fraxinus pennsylvanica* (green ash) or *Fraxinus americana* (white ash) are usually also found in the canopy. *Fraxinus nigra* (black ash) is not generally associated with this type and, if present, occurs only as scattered individuals. Other canopy or subcanopy associates may include *Liriodendron tulipifera* (tuliptree), *Quercus bicolor* (swamp white oak), *Quercus palustris* (pin oak), *Prunus serotina* (black cherry), *Fagus grandifolia* (American beech), *Betula lenta* (sweet birch), *Ulmus americana* (American elm), and *Ulmus rubra* (slippery elm). Conifers such as *Tsuga canadensis* (eastern hemlock) or *Pinus strobus* (eastern white pine) are generally absent or occur in very low abundance. The shrub layer may be fairly open to quite dense, depending on the amount of canopy closure. Shrub species commonly include *Ilex verticillata* (common winterberry), *Rhododendron viscosum* (swamp azalea), *Clethra alnifolia* (coastal sweetpepperbush), *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Alnus serrulata* (hazel alder), and less commonly *Vaccinium corymbosum* (highbush blueberry), *Lyonia ligustrina* (maleberry), *Ilex montana* (mountain holly), *Toxicodendron vernix* (poison sumac), *Viburnum dentatum* (southern arrowwood), and *Viburnum nudum var. cassinoides* (withe-rod). The herbaceous layer is variable in cover; *Symplocarpus foetidus* (skunk cabbage) and *Osmunda cinnamomea* (cinnamon fern) are nearly always present. In some areas, tall ferns (*Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), *Thelypteris palustris* (eastern marsh fern), *Thelypteris noveboracensis* (New York fern)) form an herbaceous canopy within which other species are scattered. Microtopography is generally pronounced, resulting from tip-ups. Tree seedlings and *Sphagnum* (sphagnum) mosses are common on hummocks but do not in general form extensive carpets. Additional nonvascular species can include *Plagiomnium cuspidatum* (toothed plagiomnium moss) and *Calliergon* (calliergon moss) spp. Invasive shrubs and herbs, including *Berberis thunbergii* (Japanese barberry), *Rosa multiflora* (multiflora rose), *Lonicera morrowii* (Morrow's honeysuckle), *Alliaria petiolata* (garlic mustard), and *Microstegium vimineum* (Nepalese browntop), may be abundant.

Environmental Description: This association is a seepage swamp dominated by *Acer rubrum* (red maple) and ranging from southern New England to Virginia. It generally occurs in saturated soils on slightly sloping hillsides, along small headwater streams, or in depressions at the edges of floodplains that receive overland flooding in addition to groundwater inputs. In general, these swamps are moderately acidic to moderately basic and have some seepage indicators but are not particularly species-rich. Soils are shallow to moderately deep mucks over mineral soils. Microtopography is generally pronounced, resulting from tip-ups and the braided character of the drainage. Soil samples collected from 18 Maryland and Virginia plot samples are "intermediate" in chemistry, i.e., mean pH = 5.2, mean Ca = 1071 ppm, mean Mg = 195 ppm, mean total base saturation = 57%, but are more "basic" than "acidic" in their calcium and magnesium content.

Vegetation Description: *Acer rubrum* (red maple) dominates the canopy; *Fraxinus pennsylvanica* (green ash) or *Fraxinus americana* (white ash) are usually also found in the canopy. *Fraxinus nigra* (black ash) is not generally associated with this type and, if present, occurs only as scattered individuals. Other canopy or subcanopy associates may include *Liriodendron tulipifera* (tuliptree), *Quercus bicolor* (swamp white oak), *Quercus palustris* (pin oak), *Prunus serotina* (black cherry), *Fagus grandifolia* (American beech), *Betula lenta* (sweet birch), *Ulmus americana* (American elm), and *Ulmus rubra* (slippery elm). Conifers such as *Tsuga canadensis* (eastern hemlock) or *Pinus strobus* (eastern white pine) are generally absent or occur in very low abundance. The shrub layer may be fairly open to quite dense, depending on the amount of canopy closure. Shrub species commonly include *Ilex verticillata* (common winterberry), *Rhododendron viscosum* (swamp azalea), *Clethra alnifolia* (coastal sweetpepperbush), *Lindera benzoin* (northern spicebush), *Cornus amomum* (silky dogwood), *Alnus serrulata* (hazel alder), *Carpinus caroliniana* (American hornbeam), and less commonly *Vaccinium corymbosum* (highbush blueberry), *Lyonia ligustrina* (maleberry), *Ilex montana* (mountain holly), *Toxicodendron vernix* (poison sumac), *Viburnum dentatum* (southern arrowwood), and *Viburnum nudum var. cassinoides* (withe-rod). The herbaceous layer is variable in cover; *Symplocarpus foetidus* (skunk cabbage) and *Osmunda cinnamomea* (cinnamon fern) are nearly always present. In some areas, tall ferns (*Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), *Thelypteris palustris* (eastern marsh fern), *Thelypteris noveboracensis* (New York fern)) form an herbaceous canopy within which other species are scattered. These other herbaceous species include *Impatiens capensis* (jewelweed), *Galium aparine* (stickywilly), *Geum canadense* (white avens), *Arisaema triphyllum* (Jack in the pulpit), *Carex stricta* (upright sedge), *Carex gracillima* (graceful sedge), *Carex intumescens* (greater bladder sedge), *Carex radiata* (eastern star sedge), *Carex laevivaginata* (smoothsheath sedge), *Veratrum viride* (green false hellebore), *Boehmeria cylindrica* (smallspike false nettle), *Chelone glabra* (white turtlehead), *Cardamine pensylvanica* (Pennsylvania bittercress), *Pilea pumila* (Canadian clearweed), and *Glyceria* (mannagrass) spp. At the southern end of the range in Maryland and Virginia, *Symplocarpus foetidus* (skunk cabbage) is usually greatly dominant (>50% cover) early in the growing season, with *Saururus cernuus* (lizard's tail) frequently assuming patch-dominance during the summer. Tree seedlings and *Sphagnum* (sphagnum) mosses are common on hummocks but do not in general form extensive carpets. Additional nonvascular species can include *Plagiomnium cuspidatum* (toothed plagiomnium moss) and *Calliergon* (calliergon moss) spp. Invasive shrubs and herbs, including *Berberis thunbergii* (Japanese barberry), *Rosa multiflora* (multiflora rose), *Lonicera morrowii* (Morrow's honeysuckle), *Alliaria petiolata* (garlic mustard), and *Microstegium vimineum* (Nepalese browntop), may be abundant.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Ilex verticillata* (common winterberry), *Lindera benzoin* (northern spicebush)

Herb (field)	Forb	*Symplocarpus foetidus* (skunk cabbage)
Herb (field)	Fern or fern ally	*Osmunda cinnamomea* (cinnamon fern)

Characteristic Species: *Acer rubrum* (red maple), *Clethra alnifolia* (coastal sweetpepperbush), *Fraxinus americana* (white ash), *Fraxinus pennsylvanica* (green ash), *Lindera benzoin* (northern spicebush), *Osmunda cinnamomea* (cinnamon fern), *Rhododendron viscosum* (swamp azalea), *Symplocarpus foetidus* (skunk cabbage)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This vegetation occurs in southern New England south through the mid-Atlantic states to Virginia.

States/Provinces: CT, DE?, MA, MD, NH, NJ:S3S5, NY, PA, RI, VA, VT

Federal Lands: NPS (Appomattox Court House, C&O Canal, Delaware Water Gap, Fort Necessity, Gateway, George Washington Parkway, Minute Man, Morristown, Prince William, Rock Creek, Saratoga, Upper Delaware, Weir Farm, Wolf Trap); USFWS (Great Meadows?)

CONSERVATION STATUS

Rank: G4G5 (30-Jan-2007)

Reasons: Although this is a small-patch community, its environmental requirements are quite general, and it occurs where acidic groundwater seepage emerges on the headwaters of stream drainages. The range extent crosses several ecoregions and 10 states. The major threat to this community is housing development, with disruption of groundwater source a lesser threat.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 1 - Strong

Comments: Classification of this type at the southern end of the range is supported by analysis of a 1250-plot regional dataset compiled for the NCR and Mid-Atlantic national parks vegetation mapping project. In that analysis, this association was represented a group of 18 Maryland and Virginia plots.

Similar Associations:

Acer rubrum - Betula alleghaniensis / Lindera benzoin Forest (CEGL006936)
Acer rubrum - Fraxinus nigra - (Tsuga canadensis) / Tiarella cordifolia Forest (CEGL006502)
Acer rubrum / Nemopanthus mucronatus - Vaccinium corymbosum Forest (CEGL006220)
Acer rubrum / Rhododendron viscosum - Clethra alnifolia Forest (CEGL006156)

Related Concepts:

Inland Red Maple Swamp (Breden 1989) B
Palustrine Broad-leaved Deciduous Forested Wetlands (PFO1) (Cowardin et al. 1979) ?
Red or Silver Maple-Green Ash Swamp (Thompson 1996) ?
Southern New England stream bottom forest (Rawinski 1984) ?

SOURCES

Description Authors: L.A. Sneddon, mod. S.C. Gawler and G.P. Fleming

References: Breden 1989, Breden et al. 2001, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Ehrenfeld 1977, Enser 1993, Golet et al. 1993, Harrison 2004, Metzler and Barrett 2001, NRCS 2001b, NRCS 2004, Rawinski 1984, Reschke 1990, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-29. Southern New England Red Maple Seepage Swamp in the Saratoga Battlefield Unit (Reference Observation SARA.241, NYNHP YYY). 9/20/2006. NAD 1983 / UTM easting 612010, northing 4762378.

Local Name: Swamp White Oak Floodplain Forest (CEGL006386)

SYNONYMS

USNVC English Name: Swamp White Oak - Red Maple / American Hornbeam Forest
USNVC Scientific Name: *Quercus bicolor - Acer rubrum / Carpinus caroliniana* Forest
USNVC Identifier: CEGL006386

LOCAL INFORMATION

Environmental Description: This swamp forest occurs in two primary locations at Saratoga: one at 27 m (90 feet) elevation in the Old Champlain Canal, and the other at between 85 and 92 m (280-300 feet) near the headwaters of a tributary to Mill Creek. Soil is moist, very deep to moderately deep, very poorly drained to well-drained silt loam, channery silt loam, mucky silty clay loam, and gravelly loamy sand in the Rhinebeck, Manlius-Nassau complex, Madalin, Bernardston, Fluvaquents, Limerick-Saco complex, and Teel series (NRCS 2004); the underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. Adjacent natural communities include Northeastern Dry Oak - Hickory Forest (CEGL006336), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Successional Shrubland (CEGL006451), Northeastern Old Field (CEGL006107), Little Bluestem Old Field (CEGL006333), and marsh headwater stream.

Vegetation Description: This association is characterized and dominated by *Quercus bicolor* (swamp white oak) in the tree canopy and subcanopy layers. The fairly open canopy reaches 20-25 m in height and has about 60% cover. The subcanopy is half the height (10 m tall) and has 15-20% cover. Additional, less abundant canopy associates are *Ulmus americana* (American elm), *Carya ovata* (shagbark hickory), *Prunus serotina* (black cherry), *Acer negundo* (box-elder), *Fraxinus pennsylvanica* (green ash), *Tilia americana* (American basswood), *Populus tremuloides* (quaking aspen), *Acer saccharum* (sugar maple), and *Fraxinus americana* (white ash). Most of the same species are present in the subcanopy layer with the addition of *Fraxinus nigra* (black ash), *Carpinus caroliniana* (American hornbeam), and *Rhamnus cathartica* (common buckthorn). Shrubs, both tall and short, are sparse (25-30% and 15-20%, respectively) and dominated by *Lonicera tatarica* (Tatarian honeysuckle). Associated tall shrubs include *Viburnum nudum var. cassinoides* (withe-rod), *Viburnum dentatum* (southern arrowwood), *Alnus incana ssp. rugosa* (speckled alder), *Cornus amomum* (silky dogwood), and *Ostrya virginiana* (hophornbeam), as well as canopy and subcanopy species. *Sambucus nigra* (European black elderberry), *Spiraea tomentosa* (steeplebush), *Rosa multiflora* (multiflora rose), and *Spiraea alba* var. *latifolia* are also present in the short-shrub layer. Vines are very sparse and consist of *Parthenocissus quinquefolia* (Virginia creeper) and *Toxicodendron radicans* (eastern poison ivy). The herbaceous layer can range from 65-70% cover and can be quite diverse. *Onoclea sensibilis* (sensitive fern) is strongly dominant with *Polygonum virginianum* (jumpseed), *Carex lupulina* (hop sedge), *Carex tribuloides* (blunt broom sedge), *Lysimachia nummularia* (creeping jenny), *Solidago gigantea* (giant goldenrod), *Phalaris arundinacea* (reed canarygrass), *Leersia virginica* (whitegrass), *Solidago rugosa* (wrinkleleaf

goldenrod), *Boehmeria cylindrica* (smallspike false nettle), *Impatiens capensis* (jewelweed), *Poa compressa* (Canada bluegrass), *Epilobium ciliatum* (fringed willowherb), and *Carex scoparia* (broom sedge) as associates.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Quercus bicolor* (swamp white oak)
Tree canopy	Broad-leaved deciduous tree	*Quercus bicolor* (swamp white oak)
Tree subcanopy	Broad-leaved deciduous tree	*Fraxinus nigra* (black ash), *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle), *Viburnum dentatum* (southern arrowwood)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn), *Viburnum nudum* var. *cassinoides* (withe-rod)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Carya ovata* (shagbark hickory), *Onoclea sensibilis* (sensitive fern), *Polygonum virginianum* (jumpseed), *Prunella vulgaris* (common selfheal), *Quercus bicolor* (swamp white oak), *Ulmus americana* (American elm), *Viburnum dentatum* (southern arrowwood), *Viburnum nudum* var. *cassinoides* (withe-rod)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S2S3*	B	1	Floodplain forest	Edinger et al. 2002

Local Range: This association occurs in two locations in the Battlefield Unit at Saratoga National Historical Park: one in the Old Champlain Canal, and the other near the headwaters of a tributary to Mill Creek.

Classification Comments: *Quercus bicolor* (swamp white oak) is an important indicator of this association in both topographic settings (e.g., the typical floodplain setting and the upper reaches of an intermittent stream).

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.55, SARA.83

Accuracy Assessment Observations: SARA.94 (AA), SARA.140 (AA), SARA.156 (AA), SARA.181 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Forest and Woodland (1)
Subclass	Temperate Forest (1.C)
Formation	Temperate Flooded and Swamp Forest (1.C.3)
Division	Eastern North American Flooded and Swamp Forest (D011)
Macrogroup	Northern and Central Swamp Forest (M030)
Group	Central Flatwoods and Pond Forest Group (G597)
Alliance*	*Quercus bicolor - Acer rubrum* Temporarily Flooded Forest Alliance (A.3004)
Alliance (English name)*	Swamp White Oak - Red Maple Temporarily Flooded Forest Alliance
Association	*Quercus bicolor - Acer rubrum / Carpinus caroliniana* Forest
Association (English name)	Swamp White Oak - Red Maple / American Hornbeam Forest
Ecological System(s)	Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This swamp white oak floodplain forest of lower floodplains and terraces occurs within 50 km of the coast in New Hampshire and northeastern Massachusetts. Sediments are silty, of marine or recent origin, and somewhat enriched. The canopy is characterized by *Quercus bicolor* (swamp white oak) as a dominant; *Acer rubrum* (red maple) or *Acer saccharinum* (silver maple) may also be important in the canopy. Additional canopy or subcanopy associates include *Ulmus americana* (American elm), *Fraxinus pennsylvanica* (green ash), *Betula nigra* (river birch), and occasionally *Carya ovata* (shagbark hickory). An understory of *Carpinus caroliniana* (American hornbeam) may be present. The shrub layer is characterized by some combination of *Cornus amomum* (silky dogwood), *Cephalanthus occidentalis* (common buttonbush), *Viburnum recognitum* (southern arrowwood), *Ilex verticillata* (common winterberry), *Frangula alnus* (glossy buckthorn), *Rhamnus cathartica* (common buckthorn), and *Viburnum lentago* (nannyberry). Vines are frequently present and may include *Toxicodendron radicans* (eastern poison ivy), *Menispermum canadense* (common moonseed), and *Parthenocissus quinquefolia* (Virginia creeper). The lower floodplain is more poorly drained and characterized by *Carex stricta* (upright sedge), *Carex crinita* (fringed sedge), *Boehmeria cylindrica* (smallspike false nettle), *Iris versicolor* (harlequin blueflag), *Lysimachia terrestris* (earth loosestrife), *Cinna arundinacea* (sweet woodreed), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), and *Thelypteris palustris* (eastern marsh fern), while the drier terrace is characterized by *Athyrium filix-femina* (common ladyfern), *Elymus riparius* (riverbank wildrye), *Carex debilis* (white edge sedge), *Solidago rugosa* (wrinkleleaf goldenrod), and *Thelypteris noveboracensis* (New York fern). Key diagnostic features include *Quercus bicolor* (swamp white oak) as a codominant canopy species.

Environmental Description: This swamp white oak floodplain forest of lower floodplains and terraces occurs within 50 km of the coast in New Hampshire and northeastern Massachusetts with somewhat enriched and silty sediments of marine or recent origin.

Vegetation Description: The canopy is characterized by *Quercus bicolor* (swamp white oak) as a dominant; *Acer rubrum* (red maple) or *Acer saccharinum* (silver maple) may also be important in the

canopy. Additional canopy or subcanopy associates include *Ulmus americana* (American elm), *Fraxinus pennsylvanica* (green ash), *Betula nigra* (river birch), and occasionally *Carya ovata* (shagbark hickory). An understory of *Carpinus caroliniana* (American hornbeam) may be present. The shrub layer is characterized by some combination of *Cornus amomum* (silky dogwood), *Cephalanthus occidentalis* (common buttonbush), *Viburnum recognitum* (southern arrowwood), *Ilex verticillata* (common winterberry), *Frangula alnus* (glossy buckthorn), *Rhamnus cathartica* (common buckthorn), and *Viburnum lentago* (nannyberry). Vines are frequently present and may include *Toxicodendron radicans* (eastern poison ivy), *Menispermum canadense* (common moonseed), and *Parthenocissus quinquefolia* (Virginia creeper). The lower floodplain is more poorly drained and characterized by *Carex stricta* (upright sedge), *Carex crinita* (fringed sedge), *Boehmeria cylindrica* (smallspike false nettle), *Iris versicolor* (harlequin blueflag), *Lysimachia terrestris* (earth loosestrife), *Cinna arundinacea* (sweet woodreed), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), and *Thelypteris palustris* (eastern marsh fern), while the drier terrace is characterized by *Athyrium filix-femina* (common ladyfern), *Elymus riparius* (riverbank wildrye), *Carex debilis* (white edge sedge), *Solidago rugosa* (wrinkleleaf goldenrod), and *Thelypteris noveboracensis* (New York fern).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus bicolor* (swamp white oak)
Tree subcanopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Acer saccharum* (sugar maple)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood), *Ilex verticillata* (common winterberry), *Viburnum recognitum* (southern arrowwood)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Forb	*Boehmeria cylindrica* (smallspike false nettle)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), *Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Quercus bicolor* (swamp white oak)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This association occurs in the coastal lowlands region of the northeastern U.S., from New Hampshire south to New Jersey.

States/Provinces: MA, NH, NJ, NY, PA

Federal Lands: NPS (Minute Man, Saratoga)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Acer rubrum - Prunus serotina / Cornus amomum Forest (CEGL006503)--*Acer rubrum*-dominated floodplain forest, lacks *Quercus bicolor*.

Tilia americana - Acer saccharum - Acer nigrum / Laportea canadensis Forest (CEGL006405)--enriched floodplain forest of coastal areas, but lacks *Quercus bicolor*.

Related Concepts:

Quercus bicolor/Onoclea sensibilis (Type 8) (Sperduto and Crowley 2002a) ?

Southern New England stream bottom forest (Rawinski 1984) ?

SOURCES

Description Authors: S.L. Neid, mod. S.C. Gawler

References: Breden et al. 2001, Eastern Ecology Working Group n.d., Edinger et al. 2002, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Sperduto 1997b, Sperduto 2000a, Sperduto and Crowley 2002a, Swain and Kearsley 2001



Figure F-30. Swamp White Oak Floodplain Forest in the Saratoga Battlefield Unit (AA point SARA.156, NYNHP 309). 9/21/2006. NAD 1983 / UTM easting 610221, northing 4760606.

Local Name: Bracken Grassland (CEGL005142)

SYNONYMS

USNVC English Name: Bracken Fern - Kalm's Brome Herbaceous Vegetation
USNVC Scientific Name: *Pteridium aquilinum* - *Bromus kalmii* Herbaceous Vegetation
USNVC Identifier: CEGL005142

LOCAL INFORMATION

Environmental Description: This successional fern meadow lies within a matrix of forests and old fields on moderately well-drained flats at elevations between 70 and 72 m (230-235 feet). Soil is somewhat moist, very deep, loamy fine sand in the Oakville series (NRCS 2004), and the underlying bedrock is shale and sandstone in the Canajoharie Formation. Adjacent natural communities include Little Bluestem Old Field (CEGL006333), Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046), Northern Red Oak - Northern Hardwood Forest (CEGL006173), Common Buttonbush Shrub Swamp (CEGL006069), and Eastern Cattail Marsh (CEGL006153), as well as a mowed roadside strip. The community is maintained by prescribed burning.

Vegetation Description: The vegetation of this successional meadow is dominated by ferns. The herbaceous layer (less than 1 m tall and with 75% cover) is dominated by a mix of species, including *Osmunda cinnamomea* (cinnamon fern), *Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern), *Athyrium filix-femina* (common ladyfern), and *Osmunda claytoniana* (interrupted fern) with *Solidago rugosa* (wrinkleleaf goldenrod) and lesser amounts of *Osmunda regalis* (royal fern), *Pteridium aquilinum* (western brackenfern), and *Dennstaedtia punctilobula* (eastern hayscented fern). Additional associates include *Euthamia graminifolia* (flat-top goldentop), *Geranium maculatum* (spotted geranium), *Lysimachia quadrifolia* (whorled yellow loosestrife), *Poa compressa* (Canada bluegrass), *Thelypteris noveboracensis* (New York fern), *Medeola virginiana* (Indian cucumber), *Dichanthelium clandestinum* (deertongue), *Scirpus cyperinus* (woolgrass), *Piptatherum racemosum* (blackseed ricegrass), *Lysimachia terrestris* (earth loosestrife), *Carex scabrata* (eastern rough sedge), *Lycopus uniflorus* (northern bugleweed), *Poa trivialis* (rough bluegrass), *Schizachyrium scoparium* (little bluestem), *Asclepias syriaca* (common milkweed), and *Verbena hastata* (swamp verbena). Short shrubs (less than 1 m tall) have moderately dense cover (45-50% cover), depending on the amount of time since the last fire. Dominants are *Comptonia peregrina* (sweet fern), *Rubus allegheniensis* (Allegheny blackberry), *Spiraea alba* var. *latifolia* (white meadowsweet), *Rubus hispidus* (bristly dewberry), *Rubus flagellaris* (northern dewberry), and *Spiraea tomentosa* (steeplebush) with lesser amounts of ericads *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium myrtilloides* (velvetleaf huckleberry), *Vaccinium angustifolium* (lowbush blueberry), *Vaccinium corymbosum* (highbush blueberry), and *Lyonia ligustrina* (maleberry), and seedlings of *Hamamelis virginiana* (American witchhazel), *Cornus racemosa* (gray dogwood), *Populus tremuloides* (quaking aspen), *Rosa palustris* (swamp rose), *Spiraea alba* var. *latifolia* (white meadowsweet), *Sassafras albidum* (sassafras), *Fraxinus americana* (white ash), *Acer rubrum* (red maple), and *Prunus pensylvanica* (pin cherry). A

sparse amount of low-growing *Toxicodendron radicans* (eastern poison ivy) vines is also present. There are very scattered tall shrubs and trees within the community; *Betula populifolia* (gray birch) appears in the tall-shrub layer sporadically, and *Betula lenta* (sweet birch) is in the tree canopy layer.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Betula lenta* (sweet birch)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Betula populifolia* (gray birch)
Short shrub/sapling	Broad-leaved deciduous shrub	*Comptonia peregrina* (sweet fern), *Rubus allegheniensis* (Allegheny blackberry), *Rubus hispidus* (bristly dewberry), *Spiraea alba* var. *latifolia* (white meadowsweet)
Herb (field)	Vine/Liana	*Toxicodendron radicans* (eastern poison ivy)
Herb (field)	Forb	*Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Fern or fern ally	*Athyrium filix-femina* (common ladyfern), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Osmunda claytoniana* (interrupted fern), *Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Athyrium filix-femina* (common ladyfern), *Comptonia peregrina* (sweet fern), *Dennstaedtia punctilobula* (eastern hayscented fern), *Euthamia graminifolia* (flat-top goldentop), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Osmunda claytoniana* (interrupted fern), *Osmunda regalis* (royal fern), *Pteridium aquilinum* (western brackenfern), *Rubus allegheniensis* (Allegheny blackberry), *Rubus hispidus* (bristly dewberry), *Solidago rugosa* (wrinkleleaf goldenrod), *Spiraea alba* var. *latifolia* (white meadowsweet), *Spiraea tomentosa* (steeplebush), *Thelypteris palustris* (eastern marsh fern)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	I	1	Successional fern meadow	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.32, SARA.143

Accuracy Assessment Observations: SARA.125 (AA), SARA.129 (AA), SARA.135 (AA), SARA.198 (AA), SARA.208 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate Grassland, Meadow, and Shrubland (2.C.1)
Division	Eastern North American Grassland, Meadow, and Shrubland (D024)
Macrogroup	Eastern North American Prairie and Barrens (M163)
Group	Northern and Central Sand Barrens Group (G063)
Alliance*	*Pteridium aquilinum - Bromus kalmii* Herbaceous Alliance (A.1599)
Alliance (English name)*	Bracken Fern - Kalm's Brome Herbaceous Alliance
Association	*Pteridium aquilinum - Bromus kalmii* Herbaceous Vegetation
Association (English name)	Bracken Fern - Kalm's Brome Herbaceous Vegetation
Ecological System(s)	Laurentian Pine-Oak Barrens (CES201.718)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This bracken grassland community type is found in the northern Great Lakes region of the United States and adjacent Canada. Stands occur on level plains or rolling uplands and in depressions ('frost pockets') in pitted outwash topography. Soils range from loams to fine sands, and are somewhat acid (pH 4.6). Soil characteristics vary depending on the age of the stand. Soil drainage is generally good. The vegetation is dominated by ferns and grasses. *Pteridium aquilinum* (western brackenfern) may form an almost continuous canopy of fronds. Grass dominants include *Elymus trachycaulus* (slender wheatgrass), *Bromus kalmii* (arctic brome), *Danthonia spicata* (poverty oatgrass), *Oryzopsis asperifolia* (roughleaf ricegrass), and *Poa compressa* (Canada bluegrass). Forbs of high constancy include *Anaphalis margaritacea* (western pearly everlasting), *Symphyotrichum ciliolatum* (Lindley's aster), *Fragaria virginiana* (Virginia strawberry), and *Solidago nemoralis* (gray goldenrod). Dwarf-shrubs include *Comptonia peregrina* (sweet fern) and *Vaccinium angustifolium* (lowbush blueberry). A high number of exotic or weedy species are present, including *Hieracium aurantiacum* (orange hawkweed), *Lactuca serriola* (prickly lettuce), *Phleum pratense* (timothy), *Poa compressa* (Canada bluegrass), *Poa pratensis* (Kentucky bluegrass), *Rumex acetosella* (common sheep sorrel), and *Verbascum thapsus* (common mullein).
Environmental Description: Stands occur on level plains or rolling uplands and in depressions ("frost pockets") in pitted outwash topography. Soils range from loams to fine sands, and are somewhat acid (pH 4.6). Soil characteristics vary depending on the age of the stand. Soil drainage is generally good (Curtis 1959).
Vegetation Description: The vegetation is dominated by ferns and grasses. *Pteridium aquilinum* (western brackenfern) may form an almost continuous canopy of fronds. Grass dominants include *Elymus trachycaulus* (slender wheatgrass), *Bromus kalmii* (arctic brome), *Danthonia spicata* (poverty oatgrass), *Oryzopsis asperifolia* (roughleaf ricegrass), and *Poa compressa* (Canada bluegrass). Forbs of high constancy include *Anaphalis margaritacea* (western pearly everlasting),

Symphyotrichum ciliolatum (Lindley's aster), *Fragaria virginiana* (Virginia strawberry), and *Solidago nemoralis* (gray goldenrod). Dwarf-shrubs include *Comptonia peregrina* (sweet fern) and *Vaccinium angustifolium* (lowbush blueberry). A high number of exotic or weedy species are present, including *Hieracium aurantiacum* (orange hawkweed), *Lactuca serriola* (prickly lettuce), *Phleum pratense* (timothy), *Poa compressa* (Canada bluegrass), *Poa pratensis* (Kentucky bluegrass), *Rumex acetosella* (common sheep sorrel), and *Verbascum thapsus* (common mullein) (Curtis 1959).
Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: not applicable

DISTRIBUTION

Range: This bracken grassland community type is found in the northern Great Lakes region of the United States and adjacent Canada, ranging from northern Wisconsin to Michigan and Ontario.
States/Provinces: MI?, NY, ON, WI
Federal Lands: NPS (Pictured Rocks, Saratoga); USFS (Chequamegon, Chequamegon-Nicolet, Nicolet)

CONSERVATION STATUS

Rank: GNR (3-Oct-1996)
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: This type may vary from natural to semi-natural, as most stands appear to have originated after clearcutting and intense burns of pine barrens, but some stands occur in frost pockets on pitted outwash plains. In Michigan this type has something of a natural analog in Dry Sand Prairies, *Schizachyrium scoparium - Danthonia spicata - Carex pensylvanica - (Viola pedata)* Herbaceous Vegetation (CEGL002318).
Similar Associations:

Schizachyrium scoparium - Carex tonsa var. *rugosperma - Carex muehlenbergii - Lithospermum caroliniense - Opuntia humifusa* Herbaceous Vegetation (CEGL005099)--This has more of a prairie flora, but also contains a high number of exotics.

Schizachyrium scoparium - Danthonia spicata - Carex pensylvanica - (Viola pedata) Herbaceous Vegetation (CEGL002318)--This has more of a prairie flora.

Related Concepts:

Bracken Grassland (Curtis 1959) =

SOURCES

Description Authors: D. Faber-Langendoen
References: Curtis 1959, Midwestern Ecology Working Group n.d., NRCS 2004, WNHIP unpubl. Data



Figure F-31. Bracken Grassland in the Saratoga Battlefield Unit (plot SARA.32, NYNHP K1, photo no. 195). 7/31/2003. NAD 1983 / UTM easting 612236, northing 4761987.

Local Name: Little Bluestem Old Field (CEGL006333)

SYNONYMS

USNVC English Name:	**Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Herbaceous Vegetation**
USNVC Scientific Name:	***Schizachyrium scoparium* - *(Andropogon virginicus)* - *Solidago* spp. Herbaceous Vegetation**
USNVC Identifier:	**CEGL006333**

LOCAL INFORMATION

Environmental Description: This old field vegetation occurs at elevations ranging from 60 to 113 m (190-370 feet) on hilly to flat terrain and arises spontaneously after soil disturbance. It occurs most frequently on dry, moderately well-drained to somewhat excessively drained soils composed of silt loam, channery silt loam, and loamy fine sand in the Bernardston-Manlius-Nassau complex, Bernardston, Hudson, Manlius-Nassau complex, Pittstown, and Oakville series (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Mt. Merino and Canajoharie formations. Commonly, this association is adjacent to or surrounded by Northeastern Old Field (CEGL006107), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), and/or Northeastern Modified Successional Forest (CEGL006599).

Vegetation Description: The vegetation of these herbaceous old fields is characterized and dominated by *Schizachyrium scoparium* (little bluestem) with consistent associates *Solidago juncea* (early goldenrod), *Centaurea stoebe* ssp. *micranthos* (spotted knapweed), *Solidago nemoralis* (gray goldenrod), and *Euthamia graminifolia* (flat-top goldentop). Additional associates that vary by site are *Solidago rugosa* (wrinkleleaf goldenrod), *Galium mollugo* (false baby's breath), *Thymus vulgaris* (garden thyme), *Achillea millefolium* (common yarrow), *Solidago canadensis* (Canada goldenrod), *Pycnanthemum tenuifolium* (narrowleaf mountainmint), *Centaurea jacea* (brownray knapweed), *Poa pratensis* (Kentucky bluegrass), *Hypericum perforatum* (common St. Johnswort), *Fragaria virginiana* (Virginia strawberry), *Linaria vulgaris* (butter and eggs), *Thelypteris palustris* (eastern marsh fern), *Solidago odora* (anisescented goldenrod), *Poa compressa* (Canada bluegrass), *Polygonum virginianum* (jumpseed), *Eragrostis spectabilis* (purple lovegrass), *Hypericum punctatum* (spotted St. Johnswort), *Apocynum cannabinum* (Indianhemp), and *Rumex acetosella* (common sheep sorrel), among many others. Low vines occur sporadically; species include *Parthenocissus quinquefolia* (Virginia creeper), *Toxicodendron radicans* (eastern poison ivy), and *Vitis aestivalis* (summer grape). Short shrubs are scattered throughout these fields at low abundance; *Cornus racemosa* (gray dogwood) and *Rubus flagellaris* (northern dewberry) are the most abundant. Associates are *Spiraea alba* var. *latifolia* (white meadowsweet), *Populus tremuloides* (quaking aspen), *Rubus allegheniensis* (Allegheny blackberry), *Rubus occidentalis* (black raspberry), *Lyonia ligustrina* (maleberry), *Viburnum dentatum* (southern arrowwood), *Spiraea tomentosa* (steeplebush), *Lonicera tatarica* (Tatarian honeysuckle), *Quercus coccinea* (scarlet oak), *Prunus serotina* (black cherry), *Rosa carolina* (Carolina rose), *Acer saccharinum* (silver maple), and *Rhus glabra* (smooth

sumac). Extremely sparse trees, primarily *Prunus serotina* (black cherry), are scattered across the fields as well.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Prunus serotina* (black cherry)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Spiraea alba* var. *latifolia* (white meadowsweet)
Short shrub/sapling	Broad-leaved deciduous shrub	*Rubus flagellaris* (northern dewberry)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Forb	*Centaurea stoebe* ssp. *micranthos* (spotted knapweed), *Solidago juncea* (early goldenrod)
Herb (field)	Graminoid	*Schizachyrium scoparium* (little bluestem)

Characteristic Species: *Centaurea stoebe* ssp. *micranthos* (spotted knapweed), *Cornus racemosa* (gray dogwood), *Euthamia graminifolia* (flat-top goldentop), *Rubus flagellaris* (northern dewberry), *Schizachyrium scoparium* (little bluestem), *Solidago juncea* (early goldenrod), *Solidago nemoralis* (gray goldenrod)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	I	1	Successional old field	Edinger et al. 2002

Local Range: This common association is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.29, SARA.35, SARA.36, SARA.37, SARA.38, SARA.39, SARA.41, SARA.42, SARA.43, SARA.44, SARA.45, SARA.46, SARA.47, SARA.48, SARA.49, SARA.51, SARA.53, SARA.61, SARA.64, SARA.73, SARA.87, SARA.90, SARA.92, SARA.95, SARA.99, SARA.136

Accuracy Assessment Observations: SARA.6 (AA), SARA.31 (AA), SARA.32 (AA), SARA.35 (AA), SARA.36 (AA), SARA.38 (AA), SARA.59 (AA), SARA.136 (AA), SARA.167 (AA), SARA.172 (AA), SARA.176 (AA), SARA.177 (AA), SARA.179 (AA)

Reference Observations: SARA.234, SARA.237

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate Grassland, Meadow, and Shrubland (2.C.1)
Division	Eastern North American Grassland, Meadow, and Shrubland (D024)
Macrogroup	Eastern North American Ruderal Grassland and Shrubland (M123)
Group	Northern and Central Ruderal Meadow and Shrubland Group (G059)
Alliance*	*Andropogon virginicus* Herbaceous Alliance (A.1208)
Alliance (English name)*	Broomsedge Bluestem Herbaceous Alliance
Association	*Schizachyrium scoparium* - *(Andropogon virginicus)* - *Solidago* spp. Herbaceous Vegetation
Association (English name)	Little Bluestem - (Broomsedge Bluestem) - Goldenrod species Herbaceous Vegetation
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This broadly defined vegetation type includes old fields of well-drained soils, either sandy or shallow to bedrock. They are characterized by dominance of warm-season grasses. *Schizachyrium scoparium* (little bluestem) is characteristic and nearly always present. Species composition is variable, depending on land-use history, but in general this vegetation is quite wide-ranging in northeastern and midwestern states. In addition to the nominal species, other associates may include *Andropogon virginicus* (broomsedge bluestem), *Eragrostis spectabilis* (purple lovegrass), *Festuca rubra* (red fescue), *Deschampsia flexuosa* (wavy hairgrass), *Danthonia spicata* (poverty oatgrass), *Nuttallanthus canadensis* (Canada toadflax), *Rubus flagellaris* (northern dewberry), *Panicum virgatum* (switchgrass), *Dichanthelium depauperatum* (starved panicgrass), *Potentilla simplex* (common cinquefoil), *Dichanthelium meridionale* (matting rosette grass), *Dichanthelium dichotomum* (cypress panicgrass), *Solidago rugosa* (wrinkleleaf goldenrod), and *Carex pensylvanica* (Pennsylvania sedge). Scattered shrubs are often present, including *Comptonia peregrina* (sweet fern), *Morella pensylvanica* (northern bayberry), *Gaylussacia baccata* (black huckleberry), and scattered tree saplings, such as *Prunus serotina* (black cherry), *Sassafras albidum* (sassafras), and *Juniperus virginiana* (eastern redcedar). *Polytrichum juniperinum* (juniper polytrichum moss) and other *Polytrichum* (polytrichum moss) spp. are common bryophytes.

Environmental Description: This vegetation occurs on well-drained soils, either on sandy flats or on dry knolls with shallow soils. The vegetation arises spontaneously after soil disturbance.

Vegetation Description: *Schizachyrium scoparium* (little bluestem) is characteristic and nearly always present. Species composition is variable, depending on land-use history, but in general, this vegetation is quite wide-ranging in northeastern and midwestern states. In addition to the nominal species, other associates may include *Andropogon virginicus* (broomsedge bluestem), *Eragrostis spectabilis* (purple lovegrass), *Festuca rubra* (red fescue), *Deschampsia flexuosa* (wavy hairgrass), *Centaurea stoebe* ssp. *micranthos* (spotted knapweed), *Danthonia spicata* (poverty oatgrass), *Hypericum perforatum* (common St. Johnswort), *Nuttallanthus canadensis* (Canada toadflax), *Rubus*

flagellaris (northern dewberry), *Panicum virgatum* (switchgrass), *Dichanthelium depauperatum* (starved panicgrass), *Potentilla simplex* (common cinquefoil), *Dichanthelium meridionale* (matting rosette grass), *Dichanthelium dichotomum* (cypress panicgrass), *Solidago juncea* (early goldenrod), *Solidago nemoralis* (gray goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), *Hieracium* (hawkweed) spp., and *Carex pensylvanica* (Pennsylvania sedge). Scattered shrubs are often present, including *Comptonia peregrina* (sweet fern), *Morella pensylvanica* (northern bayberry), *Gaylussacia baccata* (black huckleberry), and scattered tree saplings, such as *Prunus serotina* (black cherry), *Sassafras albidum* (sassafras), and *Juniperus virginiana* (eastern redcedar).

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Dwarf-shrub	*Rubus flagellaris* (northern dewberry)
Herb (field)	Forb	*Solidago juncea* (early goldenrod), *Solidago nemoralis* (gray goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Graminoid	*Schizachyrium scoparium* (little bluestem)

Characteristic Species: *Andropogon virginicus* (broomsedge bluestem), *Schizachyrium scoparium* (little bluestem), *Solidago juncea* (early goldenrod), *Solidago nemoralis* (gray goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This vegetation is quite wide-ranging in northeastern and midwestern states, and possibly occurs at higher elevations in the southeastern states.

States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT

Federal Lands: NPS (Boston Harbor Islands, Cape Cod, Delaware Water Gap, Fire Island, Gateway, Saratoga, Upper Delaware, Weir Farm); USFWS (Great Swamp)

CONSERVATION STATUS

Rank: GNA (invasive) (19-Jan-2006)

Reasons: This vegetation type includes pasture and post-agricultural fields.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: This type is distinguished, in theory, from the very similar *Dactylis glomerata - Phleum pratense - Festuca* spp. - *Solidago* (goldenrod) spp. Herbaceous Vegetation (CEGL006107) by the dominance of warm-season grasses as opposed to cool-season grasses (*Phleum* (timothy), *Festuca* (fescue)) dominating CEGL006017. Additional data will be required to see how this distinction holds up and what geographic differences might accompany such a distinction.

Similar Associations:

Dactylis glomerata - Phleum pratense - Festuca spp. - *Solidago* spp. Herbaceous Vegetation (CEGL006107)
Lolium (arundinaceum, pratense) Herbaceous Vegetation (CEGL004048)
Phleum pratense - Bromus pubescens - Helenium autumnale Herbaceous Vegetation (CEGL004018)
Related Concepts: Information not available.
SOURCES
Description Authors: L.A. Sneddon, mod. S.C. Gawler
References: Eastern Ecology Working Group n.d., Edinger et al. 2002, House 1917, NRCS 2001b, NRCS 2004, Newbold et al. 1988, Niering et al. 1970



Figure F-32. Little Bluestem Old Field in the Saratoga Battlefield Unit (AA point SARA.31, NYNHP 77). 9/22/2006. NAD 1983 / UTM easting 610388, northing 4762855.



Figure F-33. Little Bluestem Old Field in the Saratoga Battlefield Unit (AA point SARA.172, NYNHP 338). 8/24/2006. NAD 1983 / UTM easting 610018, northing 4762796.

Local Name: Northeastern Old Field (CEGL006107)

SYNONYMS

USNVC English Name:	**Orchard Grass - Timothy - Fescue species - Goldenrod species Herbaceous Vegetation**
USNVC Scientific Name:	***Dactylis glomerata* - *Phleum pratense* - *Festuca* spp. - *Solidago* spp. Herbaceous Vegetation**
USNVC Identifier:	**CEGL006107**

LOCAL INFORMATION

Environmental Description: This common, widespread association occurs in a variety of environmental settings between 30 and 119 m (100-390 feet) in elevation on pastures and land that has been tilled. Generally the fields are mowed at least annually. Soils vary quite a bit from site to site. At Saratoga, this old field vegetation has developed on silt loam, channery silt loam, loamy fine sand, fine sandy loam, gravelly sandy loam, and mucky silty clay loam in the Claverack, Bernardston-Manlius-Nassau complex, Hoosic, Teel, Manlius-Nassau complex, Limerick-Saco complex, Sun, Hudson, Rhinebeck, Chenango, Bernardston, Madalin, Pittstown, Oakville, Fluvaquents, and Tioga series (NRCS 2004). Bedrock is sandstone, siltstone, and shale in the Austin Glen, Mt. Merino, and Canajoharie formations. Similarly, surrounding and adjacent communities are varied. They range from successional forests [Northeastern Oak - Red Maple Successional Forest (CEGL006506), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Modified Successional Forest (CEGL006599)] and floodplain forests [Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Silver Maple Floodplain Levee Forest (CEGL006147)], to non-successional upland forests [Northern Red Oak - Northern Hardwood Forest (CEGL006173), White Pine - Oak Forest (CEGL006293)], old fields [Little Bluestem Old Field (CEGL006333)], croplands, and residential development.

Vegetation Description: The vegetation of these old fields is quite variable from one site to the next. The most characteristic and consistent species are *Centaurea jacea* (brownray knapweed), *Poa pratensis* (Kentucky bluegrass), *Galium mollugo* (false baby's breath), *Solidago canadensis* (Canada goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), *Bromus inermis* (smooth brome), *Phleum pratense* (timothy), *Euthamia graminifolia* (flat-top goldentop), *Asclepias syriaca* (common milkweed), *Schizachyrium scoparium* (little bluestem), and *Lotus corniculatus* (birdfoot deervetch). Many other herbs, both graminoids and forbs, are also present at lesser abundance and frequency; these include *Poa compressa* (Canada bluegrass), *Festuca rubra* (red fescue), *Pycnanthemum tenuifolium* (narrowleaf mountainmint), *Carex vulpinoidea* (fox sedge), *Solidago juncea* (early goldenrod), *Phalaris arundinacea* (reed canarygrass), *Daucus carota* (Queen Anne's lace), *Solidago gigantea* (giant goldenrod), *Solidago altissima* (tall goldenrod), *Solidago nemoralis* (gray goldenrod), *Onoclea sensibilis* (sensitive fern), *Juncus tenuis* (poverty rush), *Anthoxanthum odoratum* (sweet vernalgrass), *Dactylis glomerata* (orchardgrass), *Melilotus officinalis* (yellow sweetclover), and *Monarda fistulosa* (wild bergamot). Depending on the time since mowing, short shrubs and seedlings

can be somewhat commonly (just under 20% cover) intermingled with the taller herbs. *Cornus racemosa* (gray dogwood) is the most abundant species with associates that include *Rubus allegheniensis* (Allegheny blackberry), *Rubus occidentalis* (black raspberry), *Fraxinus americana* (white ash), *Lonicera tatarica* (Tatarian honeysuckle), *Populus tremuloides* (quaking aspen), *Rubus flagellaris* (northern dewberry), *Rhamnus cathartica* (common buckthorn), *Rhus glabra* (smooth sumac), *Viburnum lentago* (nannyberry), and others. The creeping vine *Vitis aestivalis* (summer grape) can also be present in low abundance. *Rhamnus cathartica* (common buckthorn) sporadically occurs as a low (13-m tall) tree,and canopy (20-m tall) trees *Ulmus americana* (American elm), *Quercus bicolor* (swamp white oak), *Quercus coccinea* (scarlet oak), *Fraxinus pennsylvanica* (green ash), and *Pinus strobus* (eastern white pine) can also occur infrequently.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Tree subcanopy	Broad-leaved deciduous tree	*Rhamnus cathartica* (common buckthorn)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Short shrub/sapling	Broad-leaved deciduous shrub	*Rubus allegheniensis* (Allegheny blackberry), *Rubus occidentalis* (black raspberry)
Herb (field)	Vine/Liana	*Vitis aestivalis* (summer grape)
Herb (field)	Forb	*Centaurea jacea* (brownray knapweed), *Galium mollugo* (false baby's breath), *Solidago canadensis* (Canada goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Graminoid	*Bromus inermis* (smooth brome), *Poa pratensis* (Kentucky bluegrass)

Characteristic Species: *Asclepias syriaca* (common milkweed), *Bromus inermis* (smooth brome), *Centaurea jacea* (brownray knapweed), *Cornus racemosa* (gray dogwood), *Euthamia graminifolia* (flat-top goldentop), *Galium mollugo* (false baby's breath), *Phleum pratense* (timothy), *Poa pratensis* (Kentucky bluegrass), *Schizachyrium scoparium* (little bluestem), *Solidago canadensis* (Canada goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	2	Successional old field	Edinger et al. 2002

Local Range: This common, widespread association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.
Classification Comments: This association could be further split into a *Solidago* (goldenrod) spp. / Asteraceae spp. dominant type with a few more native species and a *Centaurea* spp. (knapweed) dominant type with more invasive, non-native species, especially legumes.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.31, SARA.34, SARA.52, SARA.63, SARA.68, SARA.77, SARA.81, SARA.88, SARA.91, SARA.116, SARA.131
Accuracy Assessment Observations: SARA.4 (AA), SARA.11 (AA), SARA.14 (AA), SARA.33 (AA), SARA.39 (AA), SARA.40 (AA), SARA.42 (AA), SARA.44 (AA), SARA.61 (AA), SARA.62 (AA), SARA.65 (AA), SARA.66 (AA), SARA.80 (AA), SARA.81 (AA), SARA.82 (AA), SARA.83 (AA), SARA.84 (AA), SARA.85 (AA), SARA.86 (AA), SARA.87 (AA), SARA.88 (AA), SARA.89 (AA), SARA.115 (AA), SARA.144 (AA), SARA.159 (AA), SARA.160 (AA), SARA.161 (AA), SARA.163 (AA), SARA.166 (AA), SARA.168 (AA), SARA.169 (AA), SARA.170 (AA), SARA.173 (AA), SARA.174 (AA), SARA.175 (AA), SARA.182 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate Grassland, Meadow, and Shrubland (2.C.1)
Division	Eastern North American Grassland, Meadow, and Shrubland (D024)
Macrogroup	Eastern North American Ruderal Grassland and Shrubland (M123)
Group	Northern and Central Ruderal Meadow and Shrubland Group (G059)
Alliance*	*Dactylis glomerata* - *Rumex acetosella* Herbaceous Alliance (A.1190)
Alliance (English name)*	Orchard Grass - Common Sheep Sorrel Herbaceous Alliance
Association	*Dactylis glomerata* - *Phleum pratense* - *Festuca* spp. - *Solidago* spp. Herbaceous Vegetation
Association (English name)	Orchard Grass - Timothy - Fescue species - Goldenrod species Herbaceous Vegetation
Ecological System(s)	Semi-natural / Altered Vegetation and Conifer Plantations (CES203.074)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This broadly defined vegetation type includes pastures and post-agricultural fields and is largely composed of non-native cool-season grasses and herbs (generally of European origin) in the early stages of succession. The fields are typically mowed at least annually. Physiognomically, these grasslands are generally comprised of mid-height (1-3 feet tall) grasses and forbs, with occasional scattered shrubs. Species composition varies from site to site, depending on land-use history and perhaps soil type, but in general this vegetation is quite wide-ranging in northeastern and midwestern states and at higher elevations (610-1220 m [2000-4000 feet]) in the

southeastern states. Dominant grasses vary from site to site but generally feature the nominal species. Other graminoid associates may include *Agrostis stolonifera* (creeping bentgrass), *Agrostis hyemalis* (winter bentgrass), *Elymus repens* (quackgrass), *Bromus inermis* (smooth brome), *Bromus tectorum* (cheatgrass), *Lolium perenne* (perennial ryegrass), *Poa pratensis* (Kentucky bluegrass), *Poa compressa* (Canada bluegrass), *Schizachyrium scoparium* (little bluestem) (not in abundance), and *Anthoxanthum odoratum* (sweet vernalgrass). Forbs scattered among the grasses are varied but include *Hieracium* (hawkweed) spp., *Oxalis stricta* (common yellow oxalis), *Achillea millefolium* (common yarrow), *Asclepias syriaca* (common milkweed), *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago nemoralis* (gray goldenrod), *Solidago juncea* (early goldenrod), *Solidago canadensis* (Canada goldenrod), *Solidago altissima* (tall goldenrod), *Euthamia graminifolia* (flat-top goldentop), *Cerastium arvense* (field chickweed), *Oenothera biennis* (common evening-primrose), *Potentilla simplex* (common cinquefoil), *Symphyotrichum lateriflorum* (calico aster), *Symphyotrichum novae-angliae* (New England aster), *Symphyotrichum lanceolatum* (white panicle aster), *Daucus carota* (Queen Anne's lace), *Ambrosia artemisiifolia* (annual ragweed), *Vicia cracca* (bird vetch), *Trifolium* (clover) spp., and many others.

Environmental Description: This association occurs on pastures and land that has been tilled. Generally the fields are mowed at least annually.

Vegetation Description: In addition to *Dactylis glomerata* (orchardgrass) and *Phleum pratense* (timothy), these grassy fields are characterized by graminoids including *Agrostis stolonifera* (creeping bentgrass), *Agrostis hyemalis* (winter bentgrass), *Elymus repens* (quackgrass), *Bromus inermis* (smooth brome), *Bromus tectorum* (cheatgrass), *Lolium perenne* (perennial ryegrass), *Poa pratensis* (Kentucky bluegrass), *Poa compressa* (Canada bluegrass), *Schizachyrium scoparium* (little bluestem) (not in abundance), and *Anthoxanthum odoratum* (sweet vernalgrass). Forbs scattered among the grasses are varied but include *Hieracium* (hawkweed) spp., *Oxalis stricta* (common yellow oxalis), *Achillea millefolium* (common yarrow), *Asclepias syriaca* (common milkweed), *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago nemoralis* (gray goldenrod), *Solidago juncea* (early goldenrod), *Solidago canadensis* (Canada goldenrod), *Solidago altissima* (tall goldenrod), *Euthamia graminifolia* (flat-top goldentop), *Cerastium arvense* (field chickweed), *Oenothera biennis* (common evening-primrose), *Potentilla simplex* (common cinquefoil), *Symphyotrichum lateriflorum* (calico aster), *Symphyotrichum novae-angliae* (New England aster), *Symphyotrichum lanceolatum* (white panicle aster), *Daucus carota* (Queen Anne's lace), *Ambrosia artemisiifolia* (annual ragweed), *Vicia cracca* (bird vetch), *Trifolium* (clover) spp., and many others.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Rumex acetosella* (common sheep sorrel)
Herb (field)	Graminoid	*Dactylis glomerata* (orchardgrass), *Festuca rubra* (red fescue), *Phleum pratense* (timothy)

Characteristic Species: *Achillea millefolium* (common yarrow), *Anthoxanthum odoratum* (sweet vernalgrass), *Dactylis glomerata* (orchardgrass), *Euthamia graminifolia* (flat-top goldentop), *Phleum pratense* (timothy), *Rumex acetosella* (common sheep sorrel), *Solidago altissima* (tall goldenrod), *Solidago canadensis* (Canada goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This vegetation is quite wide-ranging in northeastern and midwestern states and possibly occurs at higher elevations in the southeastern states.
States/Provinces: CT, DE, KY, MA, MD, ME, NB?, NH, NJ, NS?, NY, PA, QC?, RI, TN, VA, VT, WV
Federal Lands: NPS (Allegheny Portage Railroad, Appomattox Court House, Booker T. Washington, Boston Harbor Islands, Cape Cod, Colonial, Delaware Water Gap, Fire Island, Fort Necessity, Fredericksburg-Spotsylvania, Friendship Hill, Gateway, George Washington Birthplace, Gettysburg, Johnstown Flood, Marsh-Billings-Rockefeller, Minute Man, Morristown, Petersburg, Richmond, Saint-Gaudens, Saratoga, Upper Delaware, Valley Forge, Weir Farm); USFWS (Aroostook, Assabet River, Carlton Pond, Erie, Great Meadows, Moosehorn, Nulhegan Basin, Oxbow, Parker River)

CONSERVATION STATUS

Rank: GNA (modified/managed) (8-Dec-2005)
Reasons: This vegetation type includes pasture and post-agricultural fields and is largely composed of non-native grasses and herbs (generally of European origin).

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 3 - Weak
Comments: *Schizachyrium scoparium - (Andropogon virginicus) - Solidago* spp. Herbaceous Vegetation (CEGL006333) is similar to this type but is dominated by warm-season grasses.
Similar Associations:
Lolium (arundinaceum, pratense) Herbaceous Vegetation (CEGL004048)
Phleum pratense - Bromus pubescens - Helenium autumnale Herbaceous Vegetation (CEGL004018)
Schizachyrium scoparium - (Andropogon virginicus) - Solidago spp. Herbaceous Vegetation (CEGL006333)--has a greater component of native species and occurs on drier soils.
Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler
References: Clark 1986, Dowhan and Rozsa 1989, Eastern Ecology Working Group n.d., Edinger et al. 2002, Ehrenfeld 1977, Elliman 2003, Keever 1979, NRCS 2004, Newbold et al. 1988, Perles et al. 2006a, Perles et al. 2006b, Perles et al. 2006c, Podniesinski et al. 2006, Sneddon et al. 1995, TDNH unpubl. Data



Figure F-34. Northeastern Old Field in the Saratoga Battlefield Unit - *Centaurea jacea* (brownray knapweed) dominant (AA point SARA.81, NYNHP 172). 8/17/2006. NAD 1983 / UTM easting 610074, northing 4761101.



Figure F-35. Northeastern Old Field in the Saratoga Battlefield Unit - *Solidago* spp. (goldenrod) dominant (AA point SARA.44, NYNHP 91). 9/22/2006. NAD 1983 / UTM easting 613221, northing 4761991.

Local Name: Northeastern Successional Shrubland (CEGL006451)

SYNONYMS

USNVC English Name:	**Autumn-olive - Gray Dogwood - Multiflora Rose - Eastern Red-cedar Shrubland**
USNVC Scientific Name:	***Elaeagnus umbellata - Cornus racemosa - Rosa multiflora - Juniperus virginiana* Shrubland**
USNVC Identifier:	**CEGL006451**

LOCAL INFORMATION

Environmental Description: This association occurs at elevations ranging from 26 to 102 m (85-335 feet) on former agricultural lands and old fields that are no longer intensively mowed, plowed or managed. Soils can be widely variable. At Saratoga, this community has developed on very deep, somewhat excessively drained to poorly drained soils composed of silt loam, channery silt loam, loamy fine sand, gravelly sandy loam, mucky silty clay loam, and muck in the Claverack, Rhinebeck, Hudson, Hoosic, Limerick-Saco complex, Bernardston, Manlius-Nassau complex, Oakville, Palms, Bernardston-Manlius-Nassau complex, Madalin, and Pittstown series.(NRCS 2004). The underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. Commonly, this shrubland develops within a mosaic of successional or managed communities, including cropland/field crops, Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Oak - Red Maple Successional Forest (CEGL006506), Northeastern Old Field (CEGL006107), and Little Bluestem Old Field (CEGL006333), but it is also found adjacent to Eastern Cattail Marsh (CEGL006153) and Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176).

Vegetation Description: The structure of this association varies from open herbaceous-dominated fields with scattered tall and short shrubs covering 25% of the field, to dense "closed-canopy" tall shrublands with sparse ground layer vegetation. Another common vegetation structure for this type consists of small, scattered open patches of herbaceous and graminoid old-field vegetation in a matrix of large, dense clumps of tall and short shrubs. Scattered trees are present, covering <10% of the field. Typical canopy and subcanopy tree species are *Fraxinus americana* (white ash), *Ulmus americana* (American elm), *Quercus coccinea* (scarlet oak), *Prunus serotina* (black cherry), *Acer rubrum* (red maple), *Fraxinus pennsylvanica* (green ash), and *Pinus strobus* (eastern white pine). Tall shrubs are generally somewhat sparse (<30% cover). Characteristic species are *Lonicera tatarica* (Tatarian honeysuckle), *Rhamnus cathartica* (common buckthorn), and *Cornus racemosa* (gray dogwood) with *Viburnum dentatum* (southern arrowwood), *Rhus typhina* (=*Rhus hirta*) (staghorn sumac), *Viburnum lentago* (nannyberry), *Cornus amomum* (silky dogwood), *Viburnum nudum var. cassinoides* (withe-rod), *Rubus allegheniensis* (Allegheny blackberry), *Viburnum lantana* (wayfaringtree), and species listed above in the tree layer. The short-shrub layer is denser than the tall-shrub layer (nearly 60% cover) and contains many of the same species as well as *Rubus flagellaris* (northern dewberry), *Carya glabra* (pignut hickory), *Rubus occidentalis* (black raspberry),

Quercus alba (white oak), and *Rosa multiflora* (multiflora rose). The herbaceous layer varies depending on the amount of shrub cover. Typical species are those associated with old fields, grasslands, and agricultural sites. Common species are *Solidago rugosa* (wrinkleleaf goldenrod), *Poa compressa* (Canada bluegrass), *Galium mollugo* (false baby's breath), *Onoclea sensibilis* (sensitive fern), *Centaurea jacea* (brownray knapweed), *Schizachyrium scoparium* (little bluestem), *Euthamia graminifolia* (flat-top goldentop), *Carex vulpinoidea* (fox sedge), *Poa pratensis* (Kentucky bluegrass), and *Solidago gigantea* (giant goldenrod) with associates that include *Ageratina altissima* var. *altissima* (white snakeroot), *Carex scoparia* (broom sedge), *Apocynum cannabinum* (Indianhemp), *Fragaria virginiana* (Virginia strawberry), *Agrimonia gryposepala* (tall hairy agrimony), *Polygonum sagittatum* (arrowleaf tearthumb), *Danthonia spicata* (poverty oatgrass), *Scirpus cyperinus* (woolgrass), *Daucus carota* (Queen Anne's lace), *Solidago juncea* (early goldenrod), *Achillea millefolium* (common yarrow), *Pilea pumila* (Canadian clearweed), *Solidago odora* (anisescented goldenrod), *Leersia oryzoides* (rice cutgrass), *Calamagrostis canadensis* (bluejoint), and *Solidago nemoralis* (gray goldenrod), among many others. Vines are sparse (3% cover) and include *Vitis aestivalis* (summer grape), *Parthenocissus quinquefolia* (Virginia creeper), *Vitis riparia* (riverbank grape), *Clematis virginiana* (devil's darning needles), and *Menispermum canadense* (common moonseed).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Ulmus americana* (American elm)
Tree canopy	Broad-leaved deciduous tree	*Acer rubrum* (red maple), *Fraxinus americana* (white ash), *Prunus serotina* (black cherry), *Quercus coccinea* (scarlet oak)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood), *Lonicera tatarica* (Tatarian honeysuckle)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn), *Rhus typhina* (=*Rhus hirta*) (staghorn sumac), *Viburnum dentatum* (southern arrowwood)
Herb (field)	Vine/Liana	*Vitis aestivalis* (summer grape)
Herb (field)	Forb	*Centaurea jacea* (brownray knapweed), *Euthamia graminifolia* (flat-top goldentop), *Galium mollugo* (false baby's breath), *Solidago gigantea* (giant goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Graminoid	*Carex vulpinoidea* (fox sedge), *Poa compressa* (Canada bluegrass), *Poa*

		pratensis (Kentucky bluegrass), *Schizachyrium scoparium* (little bluestem)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)
Nonvascular	Moss	*Polytrichum commune* (polytrichum moss)

Characteristic Species: *Cornus racemosa* (gray dogwood), *Galium mollugo* (false baby's breath), *Lonicera tatarica* (Tatarian honeysuckle), *Rhamnus cathartica* (common buckthorn), *Solidago rugosa* (wrinkleleaf goldenrod)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Successional shrubland	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.10, SARA.54, SARA.57, SARA.114, SARA.130, SARA.162, SARA.174

Accuracy Assessment Observations: SARA.9 (AA), SARA.13 (AA), SARA.23 (AA), SARA.27 (AA), SARA.29 (AA), SARA.37 (AA), SARA.41 (AA), SARA.45 (AA), SARA.48 (AA), SARA.53 (AA), SARA.55 (AA), SARA.120 (AA), SARA.165 (AA)

Reference Observations: SARA.229, SARA.236

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate Grassland, Meadow, and Shrubland (2.C.1)
Division	Eastern North American Grassland, Meadow, and Shrubland (D024)
Macrogroup	Eastern North American Ruderal Grassland and Shrubland (M123)
Group	Northern and Central Ruderal Meadow and Shrubland Group (G059)
Alliance*	*Cornus drummondii* Shrubland Alliance (A.3558)
Alliance (English name)*	Roughleaf Dogwood Shrubland Alliance
Association	*Elaeagnus umbellata - Cornus racemosa - Rosa multiflora - Juniperus virginiana* Shrubland
Association (English name)	Autumn Olive - Gray Dogwood - Multiflora Rose - Eastern Red-cedar Shrubland
Ecological System(s)	Semi-natural / Altered Vegetation and Conifer Plantations (CES203.074)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association comprises shrubby old fields dominated by thickets of *Elaeagnus angustifolia* (Russian olive), *Cornus racemosa* (gray dogwood), *Viburnum prunifolium* (blackhaw), *Lonicera japonica* (Japanese honeysuckle), *Lonicera morrowii* (Morrow's honeysuckle), *Ligustrum vulgare* (European privet), *Euonymus alatus* (winged burning bush), *Rosa multiflora* (multiflora rose), *Rhus glabra* (smooth sumac), and *Rhus typhina* (staghorn sumac), with patches of herbaceous vegetation among the shrubs. Shorter shrubs include *Berberis thunbergii* (Japanese barberry) and *Rubus* (blackberry) spp., and in some fields *Gaylussacia baccata* (black huckleberry), *Vaccinium pallidum* (Blue Ridge blueberry), *Vaccinium stamineum* (deerberry), and/or *Vaccinium angustifolium* (lowbush blueberry). Small trees are often present but form <25% cover; they include *Juniperus virginiana* (eastern redcedar), *Betula populifolia* (gray birch), *Prunus virginiana* (chokecherry), *Cornus florida* (flowering dogwood), *Acer rubrum* (red maple), *Juglans nigra* (black walnut), *Prunus serotina* (black cherry), *Robinia pseudoacacia* (black locust), and *Fraxinus americana* (white ash). The herbaceous layer is variable depending on the density of shrub cover. Typical species are those associated with old fields, grasslands, and agricultural sites. Common species include *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Solidago nemoralis* (gray goldenrod), *Monarda fistulosa* (wild bergamot), *Anthoxanthum odoratum* (sweet vernalgrass), *Poa pratensis* (Kentucky bluegrass), *Oxalis stricta* (common yellow oxalis), *Viola sororia* (common blue violet), *Euthamia graminifolia* (flat-top goldentop), *Festuca rubra* (red fescue), *Schizachyrium scoparium* (little bluestem), *Pycnanthemum virginianum* (Virginia mountainmint), *Alliaria petiolata* (garlic mustard), *Galium mollugo* (false baby's breath), *Potentilla simplex* (common cinquefoil), *Achillea millefolium* (common yarrow), *Daucus carota* (Queen Anne's lace), *Trifolium repens* (white clover), *Bromus inermis* (smooth brome), *Agrostis gigantea* (redtop), and *Elymus repens* (quackgrass), among many others. Vines can be absent or dominant, sometimes covering the tall and short shrubs. Common vines are *Vitis aestivalis* (summer grape), *Vitis labrusca* (fox grape), *Toxicodendron radicans* (eastern poison ivy), *Celastrus orbiculatus* (Asian bittersweet), *Parthenocissus quinquefolia* (Virginia creeper), and *Lonicera japonica* (Japanese honeysuckle).

Environmental Description: This association occurs on former agricultural lands and old fields that are no longer intensively mowed, plowed or managed. These sites contain moderately well-drained to well-drained soils. The shrublands are flat to gently sloping, often bounded by stonewalls or fencerows.

Vegetation Description: The structure of this association varies from open fields with scattered tall and short shrubs covering 25% of the field, with herbaceous vegetation in the interstices, to dense "closed-canopy" tall shrublands with sparse ground layer vegetation. Common shrubs include *Elaeagnus angustifolia* (Russian olive), *Cornus racemosa* (gray dogwood), *Viburnum prunifolium* (blackhaw), *Lonicera japonica* (Japanese honeysuckle), *Lonicera morrowii* (Morrow's honeysuckle), *Ligustrum vulgare* (European privet), *Euonymus alatus* (winged burning bush), *Rosa multiflora* (multiflora rose), *Rhus glabra* (smooth sumac), and *Rhus typhina* (staghorn sumac), with patches of herbaceous vegetation among the shrubs. Shorter shrubs include *Berberis thunbergii* (Japanese barberry) and *Rubus* (blackberry) spp., and in some fields *Gaylussacia baccata* (black huckleberry),

Vaccinium pallidum (Blue Ridge blueberry), *Vaccinium stamineum* (deerberry), and/or *Vaccinium angustifolium* (lowbush blueberry). Small trees are often present but form <25% cover; they include *Juniperus virginiana* (eastern redcedar), *Betula populifolia* (gray birch), *Prunus virginiana* (chokecherry), *Cornus florida* (flowering dogwood), *Acer rubrum* (red maple), *Juglans nigra* (black walnut), *Prunus serotina* (black cherry), *Robinia pseudoacacia* (black locust), and *Fraxinus americana* (white ash). The herbaceous layer is variable depending on the density of shrub cover. Typical species are those associated with old fields, grasslands, and agricultural sites. Common species include *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Solidago nemoralis* (gray goldenrod), *Monarda fistulosa* (wild bergamot), *Anthoxanthum odoratum* (sweet vernalgrass), *Poa pratensis* (Kentucky bluegrass), *Oxalis stricta* (common yellow oxalis), *Viola sororia* (common blue violet), *Euthamia graminifolia* (flat-top goldentop), *Festuca rubra* (red fescue), *Schizachyrium scoparium* (little bluestem), *Pycnanthemum virginianum* (Virginia mountainmint), *Alliaria petiolata* (garlic mustard), *Galium mollugo* (false baby's breath), *Potentilla simplex* (common cinquefoil), *Achillea millefolium* (common yarrow), *Daucus carota* (Queen Anne's lace), *Trifolium repens* (white clover), *Bromus inermis* (smooth brome), *Agrostis gigantea* (redtop), and *Elymus repens* (quackgrass), among many others. Vines can be absent or dominant, sometimes covering the tall and short shrubs. Common vines are *Vitis aestivalis* (summer grape), *Vitis labrusca* (fox grape), *Toxicodendron radicans* (eastern poison ivy), *Celastrus orbiculatus* (Asian bittersweet), *Parthenocissus quinquefolia* (Virginia creeper), and *Lonicera japonica* (Japanese honeysuckle).

Most Abundant Species:

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood), *Elaeagnus umbellata* (autumn olive), *Rhus glabra* (smooth sumac), *Rosa multiflora* (multiflora rose)
Tall shrub/sapling	Needle-leaved shrub	*Juniperus virginiana* (eastern redcedar)
Herb (field)	Vine/Liana	*Celastrus orbiculatus* (Asian bittersweet), *Vitis aestivalis* (summer grape), *Vitis labrusca* (fox grape)
Herb (field)	Forb	*Monarda fistulosa* (wild bergamot), *Solidago altissima* (tall goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Graminoid	*Anthoxanthum odoratum* (sweet vernalgrass), *Schizachyrium scoparium* (little bluestem)

Characteristic Species: *Anthoxanthum odoratum* (sweet vernalgrass), *Celastrus orbiculatus* (Asian bittersweet), *Cornus racemosa* (gray dogwood), *Elaeagnus umbellata* (autumn olive), *Juniperus virginiana* (eastern redcedar), *Monarda fistulosa* (wild bergamot), *Rhus glabra* (smooth sumac),

Rhus typhina (staghorn sumac), *Rosa multiflora* (multiflora rose), *Solidago altissima* (tall goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod), *Vitis aestivalis* (summer grape)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This community is common in former agricultural areas in the northeastern U.S.
States/Provinces: CT, DE, MA, NJ, NY, PA
Federal Lands: NPS (Delaware Water Gap, Gateway, Saratoga, Upper Delaware, Valley Forge); USFWS (Prime Hook)

CONSERVATION STATUS

Rank: GNA (ruderal) (23-Jun-2006)
Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: This is a broadly defined type intended for shrubby vegetation on abandoned cropland or pasture.
Similar Associations:
Cornus (amomum, sericea) - *Viburnum dentatum* - *Rosa multiflora* Shrubland (CEGL006576)
Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler
References: Eastern Ecology Working Group n.d., Keever 1979, NRCS 2001b, NRCS 2004, Newbold et al. 1988, Overlease 1987



Figure F-36. Northeastern Successional Shrubland in the Saratoga Battlefield Unit (AA point SARA.9, NYNHP 32). 9/20/2006. NAD 1983 / UTM easting 610144, northing 4759333.

Local Name: Eastern Woodland Vernal Pool (CEGL006453)

SYNONYMS

USNVC English Name: Eastern Woodland Vernal Pool Sparse Vegetation
USNVC Scientific Name: Eastern Woodland Vernal Pool Sparse Vegetation [Provisional]
USNVC Identifier: CEGL006453

LOCAL INFORMATION

Environmental Description: This vernal pool complex is located at an elevation of 70 m (230 feet) and is largely contained within Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046); Upland/Wetland Transitional Forest (CEGL006000) lies just to the west. The pools occur in small, seasonally flooded depressions within the forest. Soils are likely small pockets of very deep, nearly level, poorly drained loamy sand in the Wareham series that occur within the larger Oakville loamy fine sand unit (NRCS 2004). The underlying bedrock consists of shale and sandstone in the Canajoharie Formation.

Vegetation Description: Vernal pools range from sparsely vegetated to somewhat dense depending on the season and degree of canopy cover; on average, they are nearly 40% unvegetated. Generally, herbaceous species can reach nearly 40% cover and are dominated by *Osmunda cinnamomea* (cinnamon fern) with lesser amounts of *Osmunda regalis* (royal fern) and *Boehmeria cylindrica* (smallspike false nettle). Additional associates are *Dryopteris intermedia* (intermediate woodfern), *Scirpus cyperinus* (woolgrass), *Onoclea sensibilis* (sensitive fern), *Impatiens capensis* (jewelweed), *Thelypteris palustris* (eastern marsh fern), *Carex lurida* (shallow sedge), *Lycopus uniflorus* (northern bugleweed), *Symplocarpus foetidus* (skunk cabbage), *Carex intumescens* (greater bladder sedge), *Carex lupulina* (hop sedge), *Scirpus atrovirens* (green bulrush), and *Cinna latifolia* (drooping woodreed). The vine *Parthenocissus quinquefolia* (Virginia creeper) can be present at low abundance. Overhanging and surrounding trees and shrubs are largely those associated with the surrounding forest type, Mesic Sugar Maple - Ash - Oak - Hickory Forest. The tree canopy, which reaches over 20 m in height, provides nearly 70% cover; canopy dominants are *Acer rubrum* (red maple) and *Quercus rubra* (northern red oak). Associated canopy trees include *Quercus coccinea* (scarlet oak), *Populus tremuloides* (quaking aspen), *Betula lenta* (sweet birch), *Fraxinus pennsylvanica* (green ash), and *Quercus bicolor* (swamp white oak). The subcanopy, which reaches about 12 m in height and has just less than 20% cover, is also dominated by *Acer rubrum* (red maple) with lesser amounts of *Amelanchier arborea* (common serviceberry), *Carpinus caroliniana* (American hornbeam), *Fraxinus americana* (white ash), *Betula lenta* (sweet birch), *Pinus strobus* (eastern white pine), *Fagus grandifolia* (American beech), and *Tsuga canadensis* (eastern hemlock). Tall shrubs, reaching 5 m in height, are fairly sparse with less than 4% cover; they include *Fagus grandifolia* (American beech), *Carpinus caroliniana* (American hornbeam), *Betula lenta* (sweet birch), *Vaccinium corymbosum* (highbush blueberry), *Hamamelis virginiana* (American witchhazel), *Corylus americana* (American hazelnut), *Fraxinus americana* (white ash), and *Amelanchier arborea*

(common serviceberry). Short shrubs are similarly sparse and consist of *Vaccinium corymbosum* (highbush blueberry) and *Betula lenta* (sweet birch).

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer rubrum* (red maple)
Tree canopy	Broad-leaved deciduous tree	*Quercus rubra* (northern red oak)
Tree subcanopy	Broad-leaved deciduous tree	*Amelanchier arborea* (common serviceberry)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Carpinus caroliniana* (American hornbeam), *Fagus grandifolia* (American beech)
Short shrub/sapling	Broad-leaved deciduous shrub	*Vaccinium corymbosum* (highbush blueberry)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)
Herb (field)	Fern or fern ally	*Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern)

Characteristic Species: *Acer rubrum* (red maple), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern), *Quercus rubra* (northern red oak)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S3S4*	B	1	Vernal pool	Edinger et al. 2002

Local Range: This localized association is found in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: The vernal pool plots were sampled one year after statistical analyses were performed on plot datasets.

Other Comments: This vernal pool association is characterized by its fluctuating water levels, as well as the presence of a suite of invertebrate and amphibian species, including fingernail clams, wood frogs, and spotted salamanders. Additional invertebrates include water striders, oligocheate worms, mosquito and midge larvae, and amphipods.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.121, SARA.122, SARA.123, SARA.124

Accuracy Assessment Observations: SARA.200 (AA), SARA.201 (AA), SARA.202 (AA), SARA.203 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Scrub and Herb Coastal Vegetation (2.C.3)
Division	Eastern North American Dune and Coastal Grassland and Shrubland (D026)
Macrogroup	Eastern North American Beach, Shoreline, and Flat (M176)
Group	Eastern North American Lake Flat and Beach Group (G342)
Alliance*	Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance (A.1878)
Alliance (English name)*	Non-tidal Mudflat Seasonally/Temporarily Flooded Sparsely Vegetated Alliance
Association	Eastern Woodland Vernal Pool Sparse Vegetation [Provisional]
Association (English name)	Eastern Woodland Vernal Pool Sparse Vegetation
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or impervious bedrock at or near the surface. The substrate is mineral soil with or without a layer of muck. The species composition is variable among sites, as well as annually and seasonally. Larger examples of this community type may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae.

Environmental Description: This association is characterized by seasonally fluctuating water levels; it may dry out completely in the summer. Hydrology may be affected by impermeable soils, seasonally high water tables, seasonal flooding in nearby streams and drainages, and/or impervious bedrock at or near the surface. The substrate in most vernal pools is mineral soil with or without a layer of muck, but some are boulder-filled depressions. Boulder vernal pools may dry out completely in the summer, and their hydrology is controlled by impervious bedrock below the boulderfield.

Vegetation Description: The species composition is variable among sites, variable annually, and variable seasonally. Larger examples may exhibit strong zonation. Many smaller, shaded vernal ponds are unvegetated, their bottoms consisting of dead leaves and algae. Cover may be sparse and often varies through the season. Species composition is extremely variable, and of the species listed below, only a few are likely to be found on any one site. Typical representatives include *Dulichium arundinaceum* (threeway sedge), *Glyceria* (mannagrass) sp., *Leersia oryzoides* (rice cutgrass), *Scirpus cyperinus* (woolgrass), *Lycopus uniflorus* (northern bugleweed), *Polygonum* (knotweed) spp., *Thelypteris palustris* (eastern marsh fern), *Carex gynandra* (nodding sedge), *Carex crinita* (fringed sedge), *Carex leptonervia* (nerveless woodland sedge), *Carex stipata* (owlfruit sedge), *Carex canescens* (silvery sedge), *Carex vesicaria* (blister sedge), *Juncus effusus* (common rush), *Bidens* (beggarticks) spp., *Hypericum mutilum* (dwarf St. Johnswort), *Hypericum canadense* (lesser Canadian St. Johnswort), *Osmunda cinnamomea* (cinnamon fern), *Osmunda regalis* (royal fern), *Agrostis scabra* (rough bentgrass), *Utricularia geminiscapa* (hiddenfruit bladderwort), *Triadenum*

virginicum (Virginia marsh St. Johnswort), *Sagittaria* (arrowhead) sp., and *Eleocharis* (spikerush) spp. Although this community type is predominantly herbaceous, shrubs and small trees may be present. Typical woody species include *Vaccinium corymbosum* (highbush blueberry), *Lyonia ligustrina* (maleberry), *Quercus palustris* (pin oak), *Nyssa sylvatica* (blackgum), *Acer rubrum* (red maple), *Salix* (willow) spp., *Cephalanthus occidentalis* (common buttonbush), and *Ilex verticillata* (common winterberry).

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Ilex verticillata* (common winterberry), *Vaccinium corymbosum* (highbush blueberry)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Forb	*Sagittaria latifolia* (broadleaf arrowhead)
Herb (field)	Graminoid	*Juncus effusus* (common rush), *Leersia oryzoides* (rice cutgrass)
Herb (field)	Fern or fern ally	*Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Cephalanthus occidentalis* (common buttonbush), *Leersia oryzoides* (rice cutgrass), *Sagittaria latifolia* (broadleaf arrowhead), *Thelypteris palustris* (eastern marsh fern)

Other Noteworthy Species:

Species	GRank	Type	Note
Scirpus ancistrochaetus (barbedbristle bulrush)	G3	plant	

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association occurs in the northeastern U.S., and presumably in adjacent Canada, primarily in glaciated or periglacial areas, from Quebec and New Brunswick south through New York to northern Pennsylvania and northern New Jersey.

States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT

Federal Lands: NPS (Acadia, Delaware Water Gap, Sagamore Hill, Saratoga); USFWS (Erie, Great Swamp)

CONSERVATION STATUS

Rank: GNR (8-Feb-2006)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Provisional

Confidence: 3 - Weak

Comments: Recognition of vernal pool associations is complicated not only by the lack of good data but by the seasonal and spatial variability in composition. The largest factor, however, is that vernal

pools are generally defined by their invertebrate and amphibian communities and often do not have characteristic suites of plant species. This type should be considered tentative pending more data.
Similar Associations: Information not available.
Related Concepts: Information not available.
SOURCES
Description Authors: S.C. Gawler
References: Colburn 2004, Eastern Ecology Working Group n.d., Fike 1999, NRCS 2004, Soil Conservation Service 1987, Thompson and Sorenson 2000



Figure F-37. Eastern Woodland Vernal Pool in the Saratoga Battlefield Unit (plot SARA.123, NYNHP VP03, photo no. 170). 4/15/2005. NAD 1983 / UTM easting 612214, northing 4761645.

Local Name: Skunk Cabbage - Jewelweed Seep (CEGL006567)

SYNONYMS

USNVC English Name: Skunk-cabbage - Orange Jewelweed Herbaceous Vegetation
USNVC Scientific Name: *Symplocarpus foetidus* - *Impatiens capensis* Herbaceous Vegetation
USNVC Identifier: CEGL006567

LOCAL INFORMATION

Environmental Description: This forested seep community extends from an elevation of 46 to 64 m (150-210 feet) on a steep, high, southeast-facing hillside with a slope of 25-35%. Soil is very deep, moderately well-drained silt loam in the Hudson series that was formed in water-deposited, clay-rich material (NRCS 2004). Bedrock is shale and sandstone in the Canajoharie Formation. The seep occurs within both White Pine Successional Forest (CEGL007944) and Early-Successional Woodland/Forest (CEGL006303).

Vegetation Description: The vegetation of this herbaceous-dominated forested seep association is quite dense with up to 90% cover. *Symplocarpus foetidus* (skunk cabbage) is the dominant and characteristic herb with associates that include *Podophyllum peltatum* (mayapple), *Impatiens capensis* (jewelweed), *Ageratina altissima var. altissima* (white snakeroot), and *Osmunda claytoniana* (interrupted fern).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Impatiens capensis* (jewelweed), *Podophyllum peltatum* (mayapple), *Symplocarpus foetidus* (skunk cabbage)

Characteristic Species: *Ageratina altissima* var. *altissima* (white snakeroot), *Impatiens capensis* (jewelweed), *Podophyllum peltatum* (mayapple), *Symplocarpus foetidus* (skunk cabbage)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Intermittent stream	Edinger et al. 2002

Local Range: This community is found in one location in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.22

Accuracy Assessment Observations: None

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Bog and Fen (2.C.4)
Division	North American Bog and Fen (D029)
Macrogroup	Appalachian, Interior Plateau, and Prairie Fen (M061)
Group	Northeastern and Appalachian Forest Seep Group (G189)
Alliance*	*Symplocarpus foetidus - Caltha palustris* Saturated Herbaceous Alliance (A.1694)
Alliance (English name)*	Skunk-cabbage - Yellow Marsh-marigold Saturated Herbaceous Alliance
Association	*Symplocarpus foetidus - Impatiens capensis* Herbaceous Vegetation
Association (English name)	Skunk-cabbage - Orange Jewelweed Herbaceous Vegetation
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This small seepage wetland vegetation occurs in low-lying areas such as streamheads, lower slope drainages, and the borders of small streams where groundwater emerges. The substrate is mucky, with rocks and boulders often visibly protruding above the surface. Little quantitative data exist for this vegetation, although it appears to be quite common in the northeastern United States. Typically, this vegetation is shaded by tree species of higher ground and surrounding edges of the community, but these species are not characteristic of the vegetation and vary widely among occurrences. *Lindera benzoin* (northern spicebush) may occur, particularly at the edges. Characteristic herbaceous species are *Symplocarpus foetidus* (skunk cabbage), *Impatiens capensis* (jewelweed), and *Arisaema triphyllum* (Jack in the pulpit). Other common associates are variable but may include *Veratrum viride* (green false hellebore), *Pilea pumila* (Canadian clearweed), *Cardamine pensylvanica* (Pennsylvania bittercress), *Saxifraga pensylvanica* (eastern swamp saxifrage), *Carex canescens* (silvery sedge), *Caltha palustris* (yellow marsh marigold), and *Viola sororia* (common blue violet).

Environmental Description: Information not available.

Vegetation Description: Information not available.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Symplocarpus foetidus* (skunk cabbage)

Characteristic Species: *Arisaema triphyllum* (Jack in the pulpit), *Impatiens capensis* (jewelweed), *Symplocarpus foetidus* (skunk cabbage)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This vegetation occurs in the northeastern United States.

States/Provinces: CT, MA, MD?, ME, NH, NJ, NY, PA, RI, VT

Federal Lands: DOD (Camp Dawson); NPS (Morristown, Saratoga, Saugus Iron Works)

CONSERVATION STATUS

Rank: GNR (8-Jul-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Provisional

Confidence: 3 - Weak

Comments: Information not available.

Similar Associations:

Chrysosplenium americanum Herbaceous Vegetation (CEGL006193)

Onoclea sensibilis - (Adiantum pedatum) - Impatiens capensis - Carex plantaginea Herbaceous Vegetation [Provisional] (CEGL006409)

Vernonia noveboracensis - Thelypteris palustris - Symplocarpus foetidus Herbaceous Vegetation (CEGL006448)

Related Concepts:

Stream thicket community (Ehrenfeld 1977) B

SOURCES

Description Authors: L.A. Sneddon

References: Eastern Ecology Working Group n.d., Ehrenfeld 1977, MNNHP 1993, NRCS 2004, White and Madany 1978

Local Name: Lake Sedge Wet Meadow (CEGL002256)

SYNONYMS

USNVC English Name: Lake Sedge Herbaceous Vegetation
USNVC Scientific Name: *Carex lacustris* Herbaceous Vegetation
USNVC Identifier: CEGL002256

LOCAL INFORMATION

Environmental Description: This wet meadow community occurs at 27 m (90 feet) in elevation on a flat channel bed in a wetland complex with Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Eastern Cattail Marsh (CEGL006153), and Southern New England Red Maple Seepage Swamp (CEGL006406). Soil is very wet, very deep, poorly drained to very poorly drained silt loam with a thick surface mat of undecomposed organic matter in the Limerick-Saco complex, which formed in recent alluvium on floodplains (NRCS 2004). The underlying bedrock is siltstone and shale in the Mt. Merino Formation.

Vegetation Description: At Saratoga, this herbaceous wetland community is dominated by *Onoclea sensibilis* (sensitive fern) with *Carex lacustris* (lake sedge) as a subdominant. Additional species, present in lesser abundance, are *Boehmeria cylindrica* (smallspike false nettle), *Impatiens capensis* (jewelweed), *Symplocarpus foetidus* (skunk cabbage), *Solanum dulcamara* (climbing nightshade), *Polygonum sagittatum* (arrowleaf tearthumb), *Teucrium canadense* (Canada germander), *Rumex orbiculatus* (greater water dock), *Lysimachia ciliata* (fringed loosestrife), *Laportea canadensis* (Canadian woodnettle), and *Elymus virginicus* (Virginia wildrye). Canopy trees, which can reach 35% cover, are also present and include *Fraxinus pennsylvanica* (green ash), *Ulmus americana* (American elm), and *Salix alba* (white willow).

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash)
Herb (field)	Forb	*Boehmeria cylindrica* (smallspike false nettle)
Herb (field)	Graminoid	*Carex lacustris* (lake sedge)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Boehmeria cylindrica* (smallspike false nettle), *Carex lacustris* (lake sedge), *Onoclea sensibilis* (sensitive fern)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This association is located in the Schuyler House parcel in the Old Saratoga Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.172
Accuracy Assessment Observations: None
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Wet Meadow Group (G112)
Alliance*	*Carex lacustris* Seasonally Flooded Herbaceous Alliance (A.1367)
Alliance (English name)*	Lake Sedge Seasonally Flooded Herbaceous Alliance
Association	*Carex lacustris* Herbaceous Vegetation
Association (English name)	Lake Sedge Herbaceous Vegetation
Ecological System(s)	Eastern Great Plains Wet Meadow, Prairie, and Marsh (CES205.687) North-Central Interior Wet Meadow-Shrub Swamp (CES202.701) Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582) High Allegheny Wetland (CES202.069)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This broad-leaved wet sedge meadow type occurs in the upper central midwestern and northeastern regions of the United States. Stands occur on floodplains, shallow bays of lakes and streams, and upland depressions. Soils are mineral or well-decomposed peat. Flooding is variable but typically is seasonal. The vegetation is dominated by tall sedges. Shrubs may have up to 25% cover. *Carex lacustris* (lake sedge) forms almost mono-dominant stands. Occasionally other emergents, such as *Typha latifolia* (broadleaf cattail) or *Sagittaria* (arrowhead) spp., may codominate. In Wisconsin this type is common in the northwest, where it typically intermingles with tall shrubs, especially *Salix* (willow) spp. (e.g., *Salix petiolaris* (meadow willow)). Common herbaceous associates at low cover include *Doellingeria umbellata* (parasol whitetop), *Calamagrostis canadensis* (bluejoint), *Carex stricta* (upright sedge), *Solidago canadensis* (Canada goldenrod), *Polygonum sagittatum* (arrowleaf tearthumb), *Verbena hastata* (swamp verbena), *Impatiens capensis* (jewelweed), *Eupatorium maculatum* (spotted joepyeweed), and *Muhlenbergia glomerata* (spiked muhly).
Environmental Description: Stands occur on floodplains, shallow bays of lakes and streams, and upland depressions. Soils are mineral or well-decomposed peat. Flooding is variable but typically is seasonal.
Vegetation Description: The vegetation is dominated by tall sedges. Shrubs may have up to 25% cover. *Carex lacustris* (lake sedge) forms almost mono-dominant stands. Occasionally other

emergents, such as *Typha latifolia* (broadleaf cattail) or *Sagittaria* (arrowhead) spp., may codominate. In Wisconsin this type is common in the northwest, where it typically intermingles with tall shrubs, especially *Salix* (willow) spp. (e.g., *Salix petiolaris* (meadow willow)). Common herbaceous associates at low cover include *Doellingeria umbellata* (parasol whitetop), *Calamagrostis canadensis* (bluejoint), *Carex stricta* (upright sedge), *Solidago canadensis* (Canada goldenrod), *Polygonum sagittatum* (arrowleaf tearthumb), *Verbena hastata* (swamp verbena), *Impatiens capensis* (jewelweed), *Eupatorium maculatum* (spotted joepyeweed), and *Muhlenbergia glomerata* (spiked muhly) (E. Epstein pers. comm. 1999).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Carex lacustris* (lake sedge)

Characteristic Species: *Carex lacustris* (lake sedge)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This broad-leaved wet sedge meadow type occurs in the north-central and northeastern regions of the United States, extending from New England, Ohio and Ontario to Iowa, the Dakotas, and Manitoba.

States/Provinces: IA:SU, IL, IN, MA, MB:SU, MN, NY, OH, WI, WV:S1

Federal Lands: NPS (Minute Man, Saratoga); USFS (Chippewa, Monongahela); USFWS (Canaan Valley)

CONSERVATION STATUS

Rank: G4G5 (3-Oct-1996)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: Further characterization of this type is needed to determine whether it is a good type. It may represent a mono-dominant variant of a more broadly defined mixed broad-leaved sedge type (e.g., Bakowsky and Lee 1996). *Carex stricta* (upright sedge), by contrast, is a narrow-leaved sedge. Geographic distribution of this type versus *Carex (rostrata, utriculata)* - *Carex lacustris* - *(Carex vesicaria)* Herbaceous Vegetation (CEGL002257) also needs to be clarified. In Ohio, stands can be very large, especially in northeastern Ohio. *Carex hyalinolepis* (shoreline sedge) can also occur over large areas in Ohio (Greg Schneider pers. comm. 1996). Charles Umbanhowar should be consulted for examples of this type in southeastern Minnesota.

Similar Associations:

Carex (rostrata, utriculata) - *Carex lacustris* - *(Carex vesicaria)* Herbaceous Vegetation (CEGL002257)--a more northern coarse-sedge type.

Carex stricta - *Carex* spp. Herbaceous Vegetation (CEGL002258)--a narrow-leaved sedge type.

Related Concepts: Information not available.

Appendix F: Local and global descriptions of vegetation associations (continued).

SOURCES

Description Authors: D. Faber-Langendoen, mod. S.C. Gawler

References: Bakowsky and Lee 1996, Byers et al. 2007, Epstein pers. comm., Greenall 1996, INAI unpubl. data, Midwestern Ecology Working Group n.d., NRCS 2004, WNHIP unpubl. data

No photo available.

Local Name: Mixed Forb Marsh (CEGL006446)

SYNONYMS

USNVC English Name:	**Nodding Beggarticks - Swamp Verbena - Smartweed species Herbaceous Vegetation**
USNVC Scientific Name:	***Bidens cernua* - *Verbena hastata* - *Polygonum* spp. Herbaceous Vegetation [Provisional]**
USNVC Identifier:	**CEGL006446**

LOCAL INFORMATION

Environmental Description: This wetland association develops in early level, permanently inundated depressions in channel beds, steps-in-slope, or in high level settings. It can be found at elevations that range from 52 to 111 m (170-365 feet). Soils are saturated and generally poorly drained gravelly loamy sands, silt loams, and mucky silty clay loams in the Hudson, Rhinebeck, Fluvaquents, Madalin, Sun, and Bernardston-Manlius-Nassau complex series (NRCS 2004). The underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. The suite of communities that surround these marshes is extremely variable and dependent on past land use and localized environmental parameters. Commonly, successional and plantation forest types are found adjacent to this association, particularly Northeastern Modified Successional Forest (CEGL006599), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Oak - Red Maple Successional Forest (CEGL006506), and White Pine Plantation (CEGL007178). Marshes can also be found adjacent to old fields and croplands [Northeastern Old Field (CEGL006107), Little Bluestem Old Field (CEGL006333), cropland/field crops], swamps [Southern New England Red Maple Seepage Swamp (CEGL006406)], and upland forests [Northern Hardwood - White Pine Forest (CEGL005005), Semi-rich Northern Hardwood Forest (CEGL006211), White Pine - Hemlock Dry-Mesic Forest (CEGL006328), White Pine - Oak Forest (CEGL006293), and Northeastern Dry Oak - Hickory Forest (CEGL006336)].

Vegetation Description: The vegetation of this marsh association is extremely variable and differs from one site to the next. Herbaceous species, primarily forbs, are dominant and can reach over 90% cover. Overall, *Eupatorium maculatum* (spotted joepyeweed) and *Onoclea sensibilis* (sensitive fern) are the most abundant species; frequent and somewhat consistent associates include *Impatiens capensis* (jewelweed), *Polygonum sagittatum* (arrowleaf tearthumb), and *Leersia oryzoides* (rice cutgrass). Additional species include *Typha latifolia* (broadleaf cattail), *Carex vulpinoidea* (fox sedge), *Solidago gigantea* (giant goldenrod), *Carex lurida* (shallow sedge), *Phleum pratense* (timothy), *Carex gynandra* (nodding sedge), *Phalaris arundinacea* (reed canarygrass), *Scirpus cyperinus* (woolgrass), *Euthamia graminifolia* (flat-top goldentop), *Galium palustre* (common marsh bedstraw), *Boehmeria cylindrica* (smallspike false nettle), *Thelypteris palustris* (eastern marsh fern), *Juncus effusus* (common rush), *Galium mollugo* (false baby's breath), *Poa trivialis* (rough bluegrass), *Carex scoparia* (broom sedge), *Hydrocotyle americana* (American marshpennywort), *Apocynum*

cannabinum (Indianhemp), *Lycopus americanus* (American water horehound), *Symplocarpus foetidus* (skunk cabbage), *Alliaria petiolata* (garlic mustard), *Symphyotrichum puniceum* (purplestem aster), *Carex stricta* (upright sedge), *Lythrum salicaria* (purple loosestrife), *Iris versicolor* (harlequin blueflag), and many more. The vine *Vitis riparia* (riverbank grape) can be present at low abundance, and low shrubs, which can reach 6% cover, include *Cornus amomum* (silky dogwood), *Lonicera tatarica* (Tatarian honeysuckle), *Spiraea tomentosa* (steeplebush), *Cornus racemosa* (gray dogwood), *Viburnum lentago* (nannyberry), *Viburnum nudum var. cassinoides* (withe-rod), *Rhamnus cathartica* (common buckthorn), and *Rubus hispidus* (bristly dewberry). Additional woody species can also be present; their composition and abundance are similarly variable. *Ulmus americana* (American elm) and *Salix alba* (white willow) are dominant in the scattered tree canopy and subcanopy layers. Associates are *Populus tremuloides* (quaking aspen) and *Fraxinus pennsylvanica* (green ash). *Rhamnus cathartica* (common buckthorn) and *Viburnum nudum var. cassinoides* (withe-rod) are the most abundant tall shrubs.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Salix alba* (white willow), *Ulmus americana* (American elm)
Tree canopy	Broad-leaved deciduous tree	*Populus tremuloides* (quaking aspen)
Tree subcanopy	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn), *Viburnum nudum* var. *cassinoides* (withe-rod)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood), *Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Vine/Liana	*Vitis riparia* (riverbank grape)
Herb (field)	Forb	*Eupatorium maculatum* (spotted joepyeweed)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Eupatorium maculatum* (spotted joepyeweed), *Impatiens capensis* (jewelweed), *Leersia oryzoides* (rice cutgrass), *Onoclea sensibilis* (sensitive fern), *Polygonum sagittatum* (arrowleaf tearthumb)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This common association is found throughout the Battlefield Unit of Saratoga National Historical Park and extending onto the mapped area outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.66, SARA.67, SARA.69, SARA.72, SARA.96, SARA.97, SARA.98, SARA.126, SARA.127, SARA.128, SARA.137, SARA.144, SARA.146
Accuracy Assessment Observations: SARA.15 (AA), SARA.116 (AA), SARA.117 (AA), SARA.180 (AA), SARA.197 (AA), SARA.206 (AA), SARA.207 (AA), SARA.218 (AA), SARA.220 (AA)
Reference Observations: SARA.230, SARA.233
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Wet Meadow Group (G112)
Alliance (A.1669)*	*Pontederia cordata – Peltandra virginica* Semipermanently Flooded Herbaceous Alliance
Alliance (English name)*	Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance
Association	*Bidens cernua - Verbena hastata - Polygonum* spp. Herbaceous Vegetation [Provisional]
Association (English name)	Nodding Beggarticks - Swamp Verbena - Smartweed species Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Freshwater Marsh (CES201.594)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This variable wetland type occurs in depressions, drainages, and basins that contain ponded water throughout the year. In general, waterflow out of the sites is restricted, either due to naturally occurring depressions or from beaver activity, roads, or berms. The vegetation is dominated by species that are tolerant of standing water, and species composition is extremely variable among sites. Common species may include *Eleocharis acicularis* (needle spikerush), *Verbena hastata* (swamp verbena), *Bidens cernua* (nodding beggartick), *Eupatorium maculatum* (spotted joepyeweed), *Leersia oryzoides* (rice cutgrass), *Polygonum hydropiper* (marshpepper knotweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Equisetum arvense* (field horsetail), *Symphyotrichum novae-angliae* (New England aster), *Schoenoplectus americanus* (chairmaker's bulrush), *Carex stipata* (owlfruit sedge), *Carex vulpinoidea* (fox sedge), *Eupatorium perfoliatum* (common boneset), *Poa trivialis* (rough bluegrass), *Ludwigia palustris* (marsh seedbox), and/ or *Toxicodendron radicans* (eastern poison ivy).
Environmental Description: This variable wetland type occurs in depressions, drainages, and basins that contain ponded water throughout the year. Waterflow out of the sites is typically restricted, either due to naturally occurring depressions or from beaver activity, roads, or berms. The vegetation is often restricted to the edges of the basins, with open water remaining in the center. These wetlands typically occur on very poorly drained soils such as mucky silt loam, shallow mucky peat, and, less occasionally, on ponded gravelly sand.

Vegetation Description: This herbaceous-dominated association contains standing water for most or all of the year and is often associated with impounded drainages, ponded areas near streams, or saturated areas surrounding drainages. The vegetation is dominated by species that are tolerant of standing water, and species composition is extremely variable among sites. Common species include *Eleocharis acicularis* (needle spikerush), *Verbena hastata* (swamp verbena), *Bidens cernua* (nodding beggartick), *Eupatorium maculatum* (spotted joepyeweed), *Leersia oryzoides* (rice cutgrass), *Polygonum hydropiper* (marshpepper knotweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Equisetum arvense* (field horsetail), *Symphyotrichum novae-angliae* (New England aster), *Schoenoplectus americanus* (chairmaker's bulrush), *Carex stipata* (owlfruit sedge), *Carex vulpinoidea* (fox sedge), *Eupatorium perfoliatum* (common boneset), *Poa trivialis* (rough bluegrass), *Ludwigia palustris* (marsh seedbox), and/ or *Toxicodendron radicans* (eastern poison ivy).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Bidens cernua* (nodding beggartick), *Polygonum hydropiper* (marshpepper knotweed), *Verbena hastata* (swamp verbena)

Characteristic Species: *Bidens cernua* (nodding beggartick), *Eupatorium maculatum* (spotted joepyeweed), *Polygonum hydropiper* (marshpepper knotweed), *Toxicodendron radicans* (eastern poison ivy), *Verbena hastata* (swamp verbena)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This community is described from Pennsylvania and New Jersey and probably ranges northward.

States/Provinces: CT?, MA?, NJ, NY, PA, RI?, VT?

Federal Lands: NPS (Delaware Water Gap, Gateway, Saratoga, Upper Delaware)

CONSERVATION STATUS

Rank: GNR (7-Feb-2006)

Reasons: Better data on this community are needed in order to assign a conservation rank to it.

CLASSIFICATION INFORMATION

Status: Nonstandard

Confidence: 3 - Weak

Comments: Information not available.

Similar Associations: Information not available.

Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler, mod. E. Largay

References: Eastern Ecology Working Group n.d., FNA Editorial Committee 2006c, Fike 1999, NRCS 2001b, NRCS 2004



Figure F-38. Mixed Forb Marsh in the Saratoga Battlefield Unit (AA point SARA.197, NYNHP 391). 7/19/2006. NAD 1983 / UTM easting 611746, northing 4762298.

Local Name: Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)

SYNONYMS

USNVC English Name: **Bluejoint - Bulrush species - Threeway Sedge Herbaceous Vegetation**

USNVC Scientific Name: ***Calamagrostis canadensis* - *Scirpus* spp. - *Dulichium arundinaceum* Herbaceous Vegetation**

USNVC Identifier: **CEGL006519**

LOCAL INFORMATION

Environmental Description: This seasonally flooded meadow occurs on level ground at 95 m (310 feet) in elevation. Soil is very deep, somewhat poorly drained silt loam in the Rhinebeck series, formed in water-deposited silt and clay (NRCS 2004). Underlying bedrock is shale and siltstone in the Mt. Merino Formation. Adjacent communities are Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Successional Shrubland (CEGL006451), and cropland.

Vegetation Description: The vegetation of this herbaceous association is strongly dominated by *Scirpus atrovirens* (green bulrush) with lesser amounts of *Poa compressa* (Canada bluegrass), *Scirpus pendulus* (rufous bulrush), *Penstemon digitalis* (talus slope penstemon), *Euthamia graminifolia* (flat-top goldentop), *Phalaris arundinacea* (reed canarygrass), and *Centaurea jacea* (brownray knapweed). Herbs, which reach 80% cover, are mixed with short (<1m tall) shrubs, which have 35% cover. *Cornus racemosa* (gray dogwood) and *Fraxinus pennsylvanica* (green ash) are the most abundant species.

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus racemosa* (gray dogwood)
Herb (field)	Graminoid	*Poa compressa* (Canada bluegrass), *Scirpus atrovirens* (green bulrush)

Characteristic Species: *Cornus racemosa* (gray dogwood), *Scirpus atrovirens* (green bulrush)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: SARA.17 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Wet Meadow Group (G112)
Alliance*	*Calamagrostis canadensis* Seasonally Flooded Herbaceous Alliance (A.1400)
Alliance (English name)*	Bluejoint Seasonally Flooded Herbaceous Alliance
Association	*Calamagrostis canadensis* - *Scirpus* spp. - *Dulichium arundinaceum* Herbaceous Vegetation
Association (English name)	Bluejoint - Bulrush species - Threeway Sedge Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587) Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: These are seasonally flooded, mixed-composition wetland meadows of the northeastern United States. They occur on flats, floodplains of small streams, beaver meadows, and lakeshores. The substrate is muck or well-decomposed peat overlying mineral soil, usually slightly acidic (pH 5.0-6.0). After spring flooding, many sites will dry to exposed soil during the summer; others remain well saturated. The vegetation is dominated by robust graminoids or graminoids mixed with shrubs. Shrub cover can range up to 50%, but graminoid cover typically exceeds woody cover, and in some cases, shrubs are absent. The herbaceous layer is well-developed, often over 40% cover and up to nearly 100% cover. Bryophyte cover is usually little to none but may occasionally be extensive. The herbaceous layer is often dominated by some combination of *Calamagrostis canadensis* (bluejoint), *Scirpus* (bulrush) spp. (including *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush), and *Scirpus atrovirens* (green bulrush)), and *Dulichium arundinaceum* (threeway sedge). Other locally common species may include *Acorus calamus* (calamus), *Agrostis gigantea* (redtop), *Carex lacustris* (lake sedge), *Carex lupulina* (hop sedge), *Carex lupuliformis* (false hop sedge), *Carex lurida* (shallow sedge), *Carex stricta* (upright sedge), *Carex utriculata* (Northwest Territory sedge), *Glyceria canadensis* (rattlesnake mannagrass), *Glyceria grandis* (American mannagrass), *Iris versicolor* (harlequin blueflag), *Hypericum ellipticum* (pale St. Johnswort), *Juncus canadensis* (Canadian rush), *Leersia oryzoides* (rice cutgrass), *Leersia virginica* (whitegrass), *Lysimachia terrestris* (earth loosestrife), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), *Phalaris arundinacea* (reed canarygrass), *Poa palustris* (fowl bluegrass), and *Triadenum fraseri* (Fraser's marsh St. Johnswort). *Typha latifolia* (broadleaf cattail) may occasionally be present, but these wetlands are usually slightly higher (relative to the water table) than typical cattail marsh. *Lythrum salicaria* (purple loosestrife) may be locally invasive. Shrub species typically include *Spiraea alba* (white meadowsweet) and *Salix* (willow) spp. Other shrub constituents vary from site to site and may include *Alnus incana* (gray alder), *Alnus serrulata* (hazel alder), *Cephalanthus occidentalis* (common buttonbush), *Cornus sericea* (redosier dogwood), *Ilex*

verticillata (common winterberry), *Myrica gale* (sweetgale), *Salix pedicellaris* (bog willow), *Spiraea tomentosa* (steeplebush), *Vaccinium corymbosum* (highbush blueberry), or *Viburnum dentatum* (southern arrowwood). This association is related to other regional wet meadow types but differs in not being almost monotypically dominated by *Carex stricta* (upright sedge), *Calamagrostis canadensis* (bluejoint), or *Phalaris arundinacea* (reed canarygrass).

Environmental Description: These are seasonally flooded, mixed-composition wetland meadows of the northeastern United States. They occur on flats, floodplains of small streams, beaver meadows, and lakeshores. The substrate is muck or well-decomposed peat overlying mineral soil, usually slightly acidic (pH 5.0-6.0). After spring flooding, many sites will dry to exposed soil during the summer.

Vegetation Description: The vegetation is dominated by robust graminoids or graminoids mixed with shrubs. Shrub cover can range up to 50%, but graminoid cover typically exceeds woody cover, and in some cases, shrubs are absent. The herbaceous layer is well-developed, often over 40% cover and up to nearly 100% cover. Bryophyte cover is usually little to none but may occasionally be extensive. The herbaceous layer is often dominated by some combination of *Calamagrostis canadensis* (bluejoint), *Scirpus* (bulrush) spp. (including *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush), and *Scirpus atrovirens* (green bulrush)), and *Dulichium arundinaceum* (threeway sedge). Other locally common species may include *Acorus calamus* (calamus), *Agrostis gigantea* (redtop), *Carex lacustris* (lake sedge), *Carex lupulina* (hop sedge), *Carex lupuliformis* (false hop sedge), *Carex lurida* (shallow sedge), *Carex stricta* (upright sedge), *Carex utriculata* (Northwest Territory sedge), *Glyceria canadensis* (rattlesnake mannagrass), *Glyceria grandis* (American mannagrass), *Iris versicolor* (harlequin blueflag), *Hypericum ellipticum* (pale St. Johnswort), *Juncus canadensis* (Canadian rush), *Leersia oryzoides* (rice cutgrass), *Leersia virginica* (whitegrass), *Lysimachia terrestris* (earth loosestrife), *Onoclea sensibilis* (sensitive fern), *Osmunda regalis* (royal fern), *Phalaris arundinacea* (reed canarygrass), *Poa palustris* (fowl bluegrass), and *Triadenum fraseri* (Fraser's marsh St. Johnswort). *Typha latifolia* (broadleaf cattail) may occasionally be present, but these wetlands are usually slightly higher (relative to the water table) than typical cattail marsh. *Lythrum salicaria* (purple loosestrife) may be locally invasive. Shrub species typically include *Spiraea alba* (white meadowsweet) and *Salix* (willow) spp. Other shrub constituents vary from site to site, and may include *Alnus incana* (gray alder), *Alnus serrulata* (hazel alder), *Cephalanthus occidentalis* (common buttonbush), *Cornus sericea* (redosier dogwood), *Ilex verticillata* (common winterberry), *Myrica gale* (sweetgale), *Salix pedicellaris* (bog willow), *Spiraea tomentosa* (steeplebush), *Vaccinium corymbosum* (highbush blueberry), or *Viburnum dentatum* (southern arrowwood).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Calamagrostis canadensis* (bluejoint), *Dulichium arundinaceum* (threeway sedge), *Scirpus atrovirens* (green

bulrush), *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush)

Characteristic Species: *Calamagrostis canadensis* (bluejoint), *Dulichium arundinaceum* (threeway sedge), *Scirpus atrovirens* (green bulrush), *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush)

Other Noteworthy Species:

Species	GRank	Type	Note
Scirpus ancistrochaetus (barbedbristle bulrush)	G3	plant	

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Information not available.

States/Provinces: DE, MA, ME, NH, NY, PA, VT

Federal Lands: NPS (Acadia, Eisenhower, Gettysburg, Saint-Gaudens, Saratoga); USFWS (Aroostook?, Assabet River?, Great Meadows?, Moosehorn, Nulhegan Basin, Oxbow)

CONSERVATION STATUS

Rank: GNR (6-Jul-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Calamagrostis canadensis - Phalaris arundinacea Herbaceous Vegetation (CEGL005174)

Carex stricta - Carex vesicaria Herbaceous Vegetation (CEGL006412)

Scirpus cyperinus Seasonally Flooded Herbaceous Vegetation (CEGL006349)

Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler

References: Calhoun et al. 1994, Eastern Ecology Working Group n.d., Gawler 2002, NRCS 2004, Northern Appalachian Ecology Working Group 2000, Sperduto 2000b, Sperduto and Nichols 2004, Thompson and Sorenson 2000



Figure F-39. Seasonally Flooded Mixed Graminoid Meadow in the Saratoga Battlefield Unit (AA point SARA.17, NYNHP 51). 9/21/2006. NAD 1983 / UTM easting 609838, northing 4760562.

Local Name: Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)

SYNONYMS

USNVC English Name: **Steeplebush - Blackberry species / Reed Canarygrass Shrubland**
USNVC Scientific Name: ***Spiraea tomentosa* - *Rubus* spp. / *Phalaris arundinacea* Shrubland**
USNVC Identifier: **CEGL006571**

LOCAL INFORMATION

Environmental Description: At Saratoga, this successional wet meadow occurs in low-lying areas at elevations between 70 and 110 m (230-360 feet). Soil is very deep, well-drained to somewhat poorly drained loamy fine sand and silt loam in the Oakville, Rhinebeck, Hudson, and Bernardston series (NRCS 2004), and the underlying bedrock is sandstone, siltstone, and shale in the Mt. Merino and Canajoharie formations. This association frequently develops in successional and old field settings; common adjacent natural communities are Northeastern Modified Successional Forest (CEGL006599), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Little Bluestem Old Field (CEGL006333), Northeastern Old Field (CEGL006107), Reed Canarygrass Eastern Marsh (CEGL006044), and White Pine - Oak Forest (CEGL006293).

Vegetation Description: Woody species are moderately abundant in this community, with low shrubs (<1 m tall) covering over 40% of the area. *Spiraea alba* var. *latifolia* (white meadowsweet) and *Lyonia ligustrina* (maleberry) are the most abundant species with lesser amounts of *Populus tremuloides* (quaking aspen), *Fraxinus americana* (white ash), *Rubus flagellaris* (northern dewberry), *Spiraea tomentosa* (steeplebush), *Cornus racemosa* (gray dogwood), *Fraxinus pennsylvanica* (green ash), and *Viburnum dentatum* (southern arrowwood). Herbaceous species reach over 80% cover. The most common species are *Carex scoparia* (broom sedge), *Solidago rugosa* (wrinkleleaf goldenrod), *Thelypteris palustris* (eastern marsh fern), *Phleum pratense* (timothy), *Centaurea jacea* (brownray knapweed), and *Carex vulpinoidea* (fox sedge) with associates that include *Lycopus americanus* (American water horehound), *Solidago gigantea* (giant goldenrod), *Juncus tenuis* (poverty rush), *Festuca rubra* (red fescue), *Agrostis perennans* (upland bentgrass), *Galium mollugo* (false baby's breath), *Prunella vulgaris* (common selfheal), *Leucanthemum vulgare* (oxeye daisy), *Onoclea sensibilis* (sensitive fern), *Daucus carota* (Queen Anne's lace), *Penstemon digitalis* (talus slope penstemon), *Lythrum salicaria* (purple loosestrife), and *Scirpus atrovirens* (green bulrush).

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Lyonia ligustrina* (maleberry), *Spiraea alba* var. *latifolia* (white meadowsweet)
Herb (field)	Forb	*Solidago rugosa* (wrinkleleaf goldenrod)

Herb (field)	Graminoid	*Carex scoparia* (broom sedge), *Phleum pratense* (timothy)
Herb (field)	Fern or fern ally	*Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Carex scoparia* (broom sedge), *Carex vulpinoidea* (fox sedge), *Lyonia ligustrina* (maleberry), *Rubus flagellaris* (northern dewberry), *Solidago rugosa* (wrinkleleaf goldenrod), *Spiraea alba* var. *latifolia* (white meadowsweet), *Spiraea tomentosa* (steeplebush), *Thelypteris palustris* (eastern marsh fern)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: This association describes the *Spiraea* (spirea) spp.-dominated "shrubby wet meadow," whereas the "herbaceous wet meadow" may be classified by the dominant herbs.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.50, SARA.113

Accuracy Assessment Observations: SARA.106 (AA), SARA.192 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Wet Meadow Group (G112)
Alliance*	*Spiraea (alba, tomentosa)* - *Rubus* spp. Seasonally Flooded Shrubland Alliance (A.3022)
Alliance (English name)*	(White Meadowsweet, Steeplebush) - Blackberry species Seasonally Flooded Shrubland Alliance
Association	*Spiraea tomentosa* - *Rubus* spp. / *Phalaris arundinacea* Shrubland
Association (English name)	Steeplebush - Blackberry species / Reed Canarygrass Shrubland
Ecological System(s)	High Allegheny Wetland (CES202.069)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This wet meadow vegetation of the northeastern states occurs in a variety of settings, most frequently in low-lying areas of old fields or pastures, headwater basins, or beaver-impacted wetlands. The physiognomy is complex and variable, ranging from shrub thicket to herbaceous meadow with scattered shrubs. Shrub species usually include *Spiraea tomentosa* (steeplebush), *Spiraea alba var. alba* (white meadowsweet), *Cornus amomum* (silky dogwood),

Rubus allegheniensis (Allegheny blackberry), *Rubus hispidus* (bristly dewberry), *Salix* (willow) spp., and others. *Hypericum densiflorum* (bushy St. Johnswort) often occurs in the Central Appalachians. The invasive exotic shrubs *Lonicera morrowii* (Morrow's honeysuckle) and *Rosa multiflora* (multiflora rose) may be locally abundant. Associated herbaceous species are also variable in composition, depending on land-use history. Commonly seen are *Phalaris arundinacea* (reed canarygrass), *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Solidago canadensis* (Canada goldenrod), *Juncus effusus* (common rush), *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush), *Leersia oryzoides* (rice cutgrass), *Calamagrostis canadensis* (bluejoint), *Carex scoparia* (broom sedge), *Carex folliculata* (northern long sedge), *Carex lurida* (shallow sedge), *Carex lupulina* (hop sedge), *Carex vulpinoidea* (fox sedge), *Carex trichocarpa* (hairyfruit sedge), *Vernonia noveboracensis* (New York ironweed), *Triadenum virginicum* (Virginia marsh St. Johnswort), *Lycopus uniflorus* (northern bugleweed), *Impatiens capensis* (jewelweed), *Eupatorium maculatum* (spotted joepyeweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Thelypteris palustris* (eastern marsh fern), *Onoclea sensibilis* (sensitive fern), *Eleocharis* (spikerush) spp., and others. The invasive species *Microstegium vimineum* (Nepalese browntop), *Lythrum salicaria* (purple loosestrife), and *Phragmites australis* (common reed) can be abundant or form monocultures in these wetlands.

Environmental Description: This wet meadow vegetation of the northeastern states occurs in a variety of settings, most frequently in low-lying areas of old fields or pastures, headwater basins, or beaver-impacted wetlands. These wetlands typically flood early in the growing season and may be saturated to near the surface for some of the growing season, but they are generally dry for much of the year. The substrate is typically mineral soil with a layer of muck at the surface.

Vegetation Description: The physiognomy is complex and variable, ranging from shrub thicket to herbaceous meadow with scattered shrubs. Within each wetland, species may be locally abundant and often have patchy distribution. Shrub species usually include *Spiraea tomentosa* (steeplebush), *Spiraea alba var. alba* (white meadowsweet), *Cornus amomum* (silky dogwood), *Rubus allegheniensis* (Allegheny blackberry), *Rubus hispidus* (bristly dewberry), *Salix* (willow) spp., and others. *Hypericum densiflorum* (bushy St. Johnswort) often occurs in the Central Appalachians. The invasive exotic shrubs *Lonicera morrowii* (Morrow's honeysuckle) and *Rosa multiflora* (multiflora rose) may be locally abundant. Associated herbaceous species are also variable in composition, depending on land-use history. Commonly seen are *Phalaris arundinacea* (reed canarygrass), *Solidago rugosa* (wrinkleleaf goldenrod), *Solidago gigantea* (giant goldenrod), *Solidago canadensis* (Canada goldenrod), *Juncus effusus* (common rush), *Scirpus cyperinus* (woolgrass), *Scirpus expansus* (woodland bulrush), *Leersia oryzoides* (rice cutgrass), *Calamagrostis canadensis* (bluejoint), *Carex scoparia* (broom sedge), *Carex folliculata* (northern long sedge), *Carex lurida* (shallow sedge), *Carex lupulina* (hop sedge), *Carex vulpinoidea* (fox sedge), *Carex trichocarpa* (hairyfruit sedge), *Vernonia noveboracensis* (New York ironweed), *Triadenum virginicum* (Virginia marsh St. Johnswort), *Lycopus uniflorus* (northern bugleweed), *Impatiens capensis* (jewelweed), *Eupatorium maculatum* (spotted joepyeweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Thelypteris palustris* (eastern marsh fern), *Onoclea sensibilis* (sensitive fern), *Eleocharis* (spikerush) spp., and others.

Sphagnum (sphagnum) spp. are often abundant along with lesser amounts of other nonvascular species. The invasive species *Microstegium vimineum* (Nepalese browntop), *Lythrum salicaria* (purple loosestrife), and *Phragmites australis* (common reed) can be abundant or form monocultures in these wetlands.

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Rubus allegheniensis* (Allegheny blackberry), *Spiraea alba* var. *alba* (white meadowsweet), *Spiraea tomentosa* (steeplebush)
Herb (field)	Forb	*Solidago canadensis* (Canada goldenrod), *Solidago rugosa* (wrinkleleaf goldenrod)
Herb (field)	Graminoid	*Leersia oryzoides* (rice cutgrass), *Phalaris arundinacea* (reed canarygrass)

Characteristic Species: *Rubus allegheniensis* (Allegheny blackberry), *Spiraea tomentosa* (steeplebush)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: Although this vegetation is widespread, its range has not been evaluated. It is known from the Central Appalachian ecoregion, the High Alleghany Plateau, Western Alleghany Plateau, North Atlantic Coast, and the Lower New England / Northern Piedmont ecoregions, and is likely in others.

States/Provinces: CT, MA, NJ, NY, PA, WV:S2

Federal Lands: NPS (Allegheny Portage Railroad, Boston Harbor Islands, Cape Cod, Delaware Water Gap, Johnstown Flood, Saratoga, Upper Delaware, Weir Farm); USFS (Monongahela); USFWS (Assabet River?, Erie, Great Meadows?, Great Swamp, Parker River?)

CONSERVATION STATUS

Rank: GNR (8-Jul-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Cornus (amomum, sericea) - Viburnum dentatum - Rosa multiflora Shrubland (CEGL006576)

Related Concepts: Information not available.

SOURCES

Description Authors: L.A. Sneddon, mod. S.C. Gawler

References: Byers et al. 2007, Decker 1955, Eastern Ecology Working Group n.d., Fike 1999, NRCS 2004, NatureServe and Russell 2003



Figure F-40. Steeplebush / Reed Canarygrass Successional Wet Meadow in the Saratoga Battlefield Unit (plot SARA.113, NYNHP T4, photo no. 565). 7/22/2004. NAD 1983 / UTM easting 609938, northing 4762426.

Local Name: Woolgrass Marsh (CEGL006349)

SYNONYMS

USNVC English Name: Woolgrass Bulrush Seasonally Flooded Herbaceous Vegetation
USNVC Scientific Name: *Scirpus cyperinus* Seasonally Flooded Herbaceous Vegetation
USNVC Identifier: CEGL006349

LOCAL INFORMATION

Environmental Description: This marsh association occurs in seasonally flooded depressions in high, level settings at between 70 and 91 m (230-300 feet) in elevation. Soils are moderately well-drained to poorly drained loamy fine sands, loamy sands, and silt loams in the Oakville, Wareham, Hudson, and Rhinebeck series (NRCS 2004), and the underlying bedrock is shale and sandstone in the Canajoharie Formation. The natural communities that are most frequently adjacent to this association are Little Bluestem Old Field (CEGL006333), Northeastern Old Field (CEGL006107), White Pine Successional Forest (CEGL007944), Swamp White Oak Floodplain Forest (CEGL006386), and Northeastern Dry Oak - Hickory Forest (CEGL006336).

Vegetation Description: This seasonally flooded marsh is characterized by dominance of *Scirpus cyperinus* (woolgrass), which can attain nearly 50% cover. Common, semi-abundant associates are *Onoclea sensibilis* (sensitive fern), *Polygonum sagittatum* (arrowleaf tearthumb), *Thelypteris palustris* (eastern marsh fern), *Carex vulpinoidea* (fox sedge), *Lycopus americanus* (American water horehound), *Carex scoparia* (broom sedge), *Juncus effusus* (common rush), *Dulichium arundinaceum* (threeway sedge), *Eleocharis ovata* (ovate spikerush), and *Typha latifolia* (broadleaf cattail). Additional herbaceous species, present in lesser abundance, are *Agrimonia gryposepala* (tall hairy agrimony), *Galium tinctorium* (stiff marsh bedstraw), *Leersia oryzoides* (rice cutgrass), *Scirpus atrovirens* (green bulrush), *Euthamia graminifolia* (flat-top goldentop), *Asclepias incarnata* (swamp milkweed), *Galium mollugo* (false baby's breath), *Ludwigia palustris* (marsh seedbox), *Eupatorium maculatum* (spotted joepyeweed), *Centaurea jacea* (brownray knapweed), *Epilobium coloratum* (purpleleaf willowherb), *Erechtites hieraciifolia* (American burnweed), and *Verbena hastata* (swamp verbena). Short shrubs can be slightly dense, with nearly 30% cover. *Spiraea alba* var. *latifolia* (white meadowsweet), *Spiraea tomentosa* (steeplebush), *Cephalanthus occidentalis* (common buttonbush), and *Salix* (willow) sp. are the most abundant species with associates that include *Cornus amomum* (silky dogwood), *Viburnum nudum var. cassinoides* (withe-rod), *Viburnum dentatum* (southern arrowwood), *Lyonia ligustrina* (maleberry), *Cornus racemosa* (gray dogwood), *Rubus hispidus* (bristly dewberry), and *Spiraea alba* var. *latifolia* (white meadowsweet). Scattered tall shrubs, mainly *Rhamnus cathartica* (common buckthorn), are sometimes present. Similarly, scattered trees (primarily *Quercus bicolor* (swamp white oak) and *Ulmus americana* (American elm)) can occur, depending on the site.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus bicolor* (swamp white oak), *Ulmus americana* (American elm)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush), *Spiraea alba* var. *latifolia* (white meadowsweet), *Spiraea tomentosa* (steeplebush)
Herb (field)	Forb	*Polygonum sagittatum* (arrowleaf tearthumb)
Herb (field)	Graminoid	*Scirpus cyperinus* (woolgrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern)

Characteristic Species: *Onoclea sensibilis* (sensitive fern), *Scirpus cyperinus* (woolgrass), *Spiraea alba* var. *latifolia* (white meadowsweet), *Spiraea tomentosa* (steeplebush), *Thelypteris palustris* (eastern marsh fern)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit of Saratoga National Historical Park.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.82, SARA.100
Accuracy Assessment Observations: SARA.95 (AA), SARA.127 (AA), SARA.128 (AA), SARA.132 (AA)
Reference Observations: SARA.224, SARA.240
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Wet Meadow Group (G112)
Alliance	*Scirpus cyperinus* Seasonally Flooded Herbaceous Alliance (A.1386)
Alliance (English name)	Woolgrass Bulrush Seasonally Flooded Herbaceous Alliance

Association	*Scirpus cyperinus* Seasonally Flooded Herbaceous Vegetation
Association (English name)	Woolgrass Bulrush Seasonally Flooded Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582)
	Laurentian-Acadian Freshwater Marsh (CES201.594)
	High Allegheny Wetland (CES202.069)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This seasonally flooded marsh occurs in the northeastern United States. It is dominated or characterized by *Scirpus cyperinus* (woolgrass), but composition is variable. Associates include *Glyceria* (mannagrass) spp., *Thelypteris palustris* (eastern marsh fern), as well as other species of *Scirpus* (bulrush) including *Scirpus microcarpus* (panicled bulrush) and *Scirpus atrovirens* (green bulrush).

Environmental Description: These are seasonally flooded marshes.

Vegetation Description: This community is dominated or characterized by *Scirpus cyperinus* (woolgrass). Composition is variable. Associates include *Glyceria* (mannagrass) spp., *Thelypteris palustris* (eastern marsh fern), as well as other species of *Scirpus* (bulrush), including *Scirpus microcarpus* (panicled bulrush) and *Scirpus atrovirens* (green bulrush).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Scirpus cyperinus* (woolgrass)

Characteristic Species: *Scirpus cyperinus* (woolgrass)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This seasonally flood marsh occurs throughout the northeastern U.S. from Maine to West Virginia.

States/Provinces: CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV:S3

Federal Lands: NPS (Cape Cod, Gateway, Saratoga, Thomas Stone); USFS (Monongahela); USFWS (Assabet River?, Canaan Valley, Chincoteague, Erie, Great Meadows?)

CONSERVATION STATUS

Rank: GNR (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: Information not available.

Similar Associations:

Calamagrostis canadensis - Scirpus spp. - *Dulichium arundinaceum* Herbaceous Vegetation (CEGL006519)

Related Concepts:

Shallow emergent marsh (Cowardin et al. 1979) ?

SOURCES

Description Authors: R.E. Zaremba and L.A. Sneddon

References: Breden et al. 2001, Byers et al. 2007, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Fike 1999, Gawler 2002, Harrison 2004, NRCS 2001b, NRCS 2004, Walbridge 1982



Figure F-41. Woolgrass Marsh in the Saratoga Battlefield Unit (AA point SARA.128, NYNHP 261). 8/18/2006. NAD 1983 / UTM easting 612226, northing 4762152.

Local Name: Eastern Cattail Marsh (CEGL006153)

SYNONYMS

USNVC English Name:	**(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Eastern Herbaceous Vegetation**
USNVC Scientific Name:	***Typha (angustifolia, latifolia)* - *(Schoenoplectus* spp.) Eastern Herbaceous Vegetation**
USNVC Identifier:	**CEGL006153**

LOCAL INFORMATION

Environmental Description: While all the examples of Eastern Cattail Marsh at Saratoga occur in permanently flooded basins, the landscape setting, surrounding topography, and soils of each are extremely variable. They can occur from 29 to 107 m (95-350 feet) in elevation on shallow to very deep soils composed of silt loam, channery silt loam, muck, mucky silty clay loam, gravelly loamy sand, loamy fine sand, or fine sandy loam. Marshes at Saratoga occur on soils in the Limerick-Saco complex, Hudson, Bernardston-Manlius-Nassau complex, Manlius-Nassau complex, Mosherville-Hornell complex, Sun, Bernardston, Palms, Broadalbin, Rhinebeck, Madalin, Fluvaquents, Oakville, Teel, and Tioga series (NRCS 2004). Bedrock is sandstone, siltstone, and shale in the Austin Glen, Mt. Merino, and Canajoharie formations. This association can occur as part of a larger wetland complex, adjacent to Southern New England Red Maple Seepage Swamp (CEGL006406), Elm - Ash / Skunk Cabbage Swamp (CEGL006966), Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), Mixed Forb Marsh (CEGL006446), Northeastern Leafy Forb Marsh (CEGL006191), Common Duckweed Herbaceous Vegetation (CEGL005451), or rocky headwater stream. Adjacent or surrounding communities also include upland forests or fields, such as Northeastern Oak - Red Maple Successional Forest (CEGL006506), Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Northeastern Modified Successional Forest (CEGL006599), Semi-rich Northern Hardwood Forest (CEGL006211), White Pine - Oak Forest (CEGL006293), Northeastern Dry Oak - Hickory Forest (CEGL006336), Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301), Northern Red Oak - Northern Hardwood Forest (CEGL006173), Northeastern Successional Shrubland (CEGL006451), cropland (pasture and field crops), and Northeastern Old Field (CEGL006107).
Vegetation Description: This association is characterized and dominated by *Typha latifolia* (broadleaf cattail), which is significantly more abundant than its associates. Other common species include *Mentha arvensis* (wild mint), *Carex lurida* (shallow sedge), *Scirpus cyperinus* (woolgrass), *Eupatorium perfoliatum* (common boneset), *Phalaris arundinacea* (reed canarygrass), *Galium palustre* (common marsh bedstraw), *Boehmeria cylindrica* (smallspike false nettle), *Carex scoparia* (broom sedge), *Carex vulpinoidea* (fox sedge), *Epilobium coloratum* (purpleleaf willowherb), *Juncus effusus* (common rush), *Poa trivialis* (rough bluegrass), *Polygonum sagittatum* (arrowleaf tearthumb), and *Impatiens capensis* (jewelweed). Floating aquatics, primarily *Lemna minor* (common

duckweed), are occasionally common. Short shrubs are very sparse and short; *Cornus amomum* (silky dogwood) is the most abundant species.

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood)
Herb (field)	Forb	*Mentha arvensis* (wild mint)
Herb (field)	Graminoid	*Typha latifolia* (broadleaf cattail)
Floating aquatic	Aquatic herb	*Lemna minor* (common duckweed)

Characteristic Species: *Typha latifolia* (broadleaf cattail)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This widespread association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.60, SARA.78

Accuracy Assessment Observations: None

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Freshwater Marsh Group (G125)
Alliance*	*Typha (angustifolia, latifolia)* - *(Schoenoplectus* spp.) Semipermanently Flooded Herbaceous Alliance (A.1436)
Alliance (English name)*	(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Semipermanently Flooded Herbaceous Alliance
Association	*Typha (angustifolia, latifolia)* - *(Schoenoplectus* spp.) Eastern Herbaceous Vegetation
Association (English name)	(Narrowleaf Cattail, Broadleaf Cattail) - (Clubrush species) Eastern Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Freshwater Marsh (CES201.594)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: These tall emergent marshes are common throughout the northeastern United States and adjacent Canadian provinces. They occur in permanently flooded basins, often as part of a

larger wetland mosaic and associated with lakes, ponds, or slow-moving streams. The substrate is muck over mineral soil. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. Tall graminoids dominate the vegetation; scattered shrubs are often present (usually totaling less than 25% cover) and are frequently shorter than the graminoids. Trees are absent. Bryophyte cover varies and is rarely extensive; bryophytes are mostly confined to the hummocks. *Typha angustifolia* (narrowleaf cattail), *Typha latifolia* (broadleaf cattail), or their hybrid *Typha X glauca* (blue cattail) dominate, either alone or in combination with other tall emergent marsh species. Associated species vary widely; sedges, such as *Carex aquatilis* (water sedge), *Carex lurida* (shallow sedge), *Carex rostrata* (beaked sedge), *Carex pellita* (woolly sedge), *Carex stricta* (upright sedge), *Scirpus cyperinus* (woolgrass), and bulrushes, such as *Schoenoplectus americanus* (chairmaker's bulrush) and *Schoenoplectus acutus* (hardstem bulrush), occur along with patchy grasses, such as *Calamagrostis canadensis* (bluejoint). Broad-leaved herbs include *Thelypteris palustris* (eastern marsh fern), *Asclepias incarnata* (swamp milkweed), *Onoclea sensibilis* (sensitive fern), *Symplocarpus foetidus* (skunk cabbage), *Calla palustris* (water arum), *Impatiens capensis* (jewelweed), *Sagittaria latifolia* (broadleaf arrowhead), *Scutellaria lateriflora* (blue skullcap), *Sparganium eurycarpum* (broadfruit bur-reed), and *Verbena hastata* (swamp verbena). Floating aquatics, such as *Lemna minor* (common duckweed), may be common in deeper zones. Shrub species vary across the geographic range of this type; in the northern part of its range, *Myrica gale* (sweetgale), *Ilex verticillata* (common winterberry), and *Spiraea alba* (white meadowsweet) are common. The invasive exotic plants *Lythrum salicaria* (purple loosestrife) and *Phragmites australis* (common reed) may be abundant in parts of some occurrences. This association is distinguished from other northeastern freshwater marshes by the strong dominance of *Typha* (cattail) spp.

Environmental Description: These tall emergent marshes are common throughout the northeastern United States and adjacent Canadian provinces. They occur in permanently flooded basins, often as part of a larger wetland mosaic and associated with lakes, ponds, or slow-moving streams. The substrate is muck over mineral soil. Lacustrine cattail marshes typically have a muck-bottom zone bordering the shoreline, where cattails are rooted in the bottom substrate, and a floating mat zone, where the roots grow suspended in a buoyant peaty mat. This association is often found in impounded waters.

Vegetation Description: Tall graminoids dominate the vegetation; scattered shrubs are often present (usually totaling less than 25% cover) and are frequently shorter than the graminoids. Trees are absent. Bryophyte cover varies and is rarely extensive; bryophytes are mostly confined to the hummocks. *Typha angustifolia* (narrowleaf cattail), *Typha latifolia* (broadleaf cattail), or their hybrid *Typha X glauca* (blue cattail) dominate, either alone or in combination with other tall emergent marsh species. Associated species vary widely; sedges, such as *Carex aquatilis* (water sedge), *Carex lurida* (shallow sedge), *Carex rostrata* (beaked sedge), *Carex pellita* (woolly sedge), *Carex stricta* (upright sedge), *Scirpus cyperinus* (woolgrass), and bulrushes, such as *Schoenoplectus americanus* (chairmaker's bulrush) and *Schoenoplectus acutus* (hardstem bulrush), occur along with patchy

grasses, such as *Calamagrostis canadensis* (bluejoint). Broad-leaved herbs include *Thelypteris palustris* (eastern marsh fern), *Asclepias incarnata* (swamp milkweed), *Onoclea sensibilis* (sensitive fern), *Symplocarpus foetidus* (skunk cabbage), *Calla palustris* (water arum), *Impatiens capensis* (jewelweed), *Sagittaria latifolia* (broadleaf arrowhead), *Scutellaria lateriflora* (blue skullcap), *Sparganium eurycarpum* (broadfruit bur-reed), and *Verbena hastata* (swamp verbena). Floating aquatics, such as *Lemna minor* (common duckweed), may be common in deeper zones. Shrub species vary across the geographic range of this type; in the northern part of its range, *Myrica gale* (sweetgale), *Ilex verticillata* (common winterberry), and *Spiraea alba* (white meadowsweet) are common. The invasive exotic plants *Lythrum salicaria* (purple loosestrife) and *Phragmites australis* (common reed) may be abundant in parts of some occurrences.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Typha angustifolia* (narrowleaf cattail), *Typha latifolia* (broadleaf cattail), *Typha* x *glauca* (blue cattail)

Characteristic Species: *Onoclea sensibilis* (sensitive fern), *Schoenoplectus acutus* (hardstem bulrush), *Schoenoplectus americanus* (chairmaker's bulrush), *Typha angustifolia* (narrowleaf cattail), *Typha latifolia* (broadleaf cattail)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This association occurs throughout the northeastern U.S. from Maine to North Carolina.

States/Provinces: CT, DE, MA, MD, ME:S5, NC, NH:S4?, NJ:S5, NY, PA:S5, RI, VA, VT, WV

Federal Lands: NPS (Acadia, Blue Ridge Parkway?, Boston Harbor Islands, Cape Cod, Delaware Water Gap, Johnstown Flood, Minute Man, Saint-Gaudens, Saratoga, Upper Delaware); USFS (Nantahala?, Pisgah?); USFWS (Aroostook, Assabet River, Carlton Pond?, Erie, Great Meadows, Great Swamp, Moosehorn, Nomans Land Island, Nulhegan Basin, Oxbow, Pondicherry?, Prime Hook)

CONSERVATION STATUS

Rank: G5 (1-Dec-1997)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: *Typha angustifolia* (narrowleaf cattail) can grow in deeper water compared to *Typha latifolia* (broadleaf cattail), although both species reach maximum growth at a water depth of 50 cm (Grace and Wetzel 1981). *Typha* (cattail) often occurs in pure stands and can colonize areas recently exposed by either natural or human causes.

Similar Associations:

Typha latifolia Southern Herbaceous Vegetation (CEGL004150)
Typha spp. - *Schoenoplectus acutus* - Mixed Herbs Midwest Herbaceous Vegetation (CEGL002229)
Typha spp. - *Schoenoplectus tabernaemontani* - Mixed Herbs Southern Great Lakes Shore Herbaceous Vegetation (CEGL005112)
Typha spp. Midwest Herbaceous Vegetation (CEGL002233)

Related Concepts:

Cattail Marsh (Thompson 1996) ?
Cattail marsh (CAP pers. comm. 1998) ?
Palustrine Narrow-leaved Persistent Emergent Wetland, Permanently Flooded (PEM5H) (Cowardin et al. 1979) ?
Robust Emergent Marsh (Breden 1989) ?
Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?
Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

SOURCES

Description Authors: S.C. Gawler

References: Breden 1989, Breden et al. 2001, CAP pers. comm. 1998, Clancy 1996, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Gawler 2002, Grace and Wetzel 1981, Harrison 2004, Metzler and Barrett 2001, NRCS 2004, Northern Appalachian Ecology Working Group 2000, Rawinski 1984, Sperduto and Nichols 2004, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000

Local Name: Northeastern Leafy Forb Marsh (CEGL006191)

SYNONYMS

USNVC English Name:	**Pickerelweed - Green Arrow-arum - Broadleaf Arrowhead Herbaceous Vegetation**
USNVC Scientific Name:	***Pontederia cordata - Peltandra virginica - Sagittaria latifolia* Herbaceous Vegetation**
USNVC Identifier:	**CEGL006191**

LOCAL INFORMATION

Environmental Description: This deep emergent marsh occurs in standing water, mainly within channel beds, at varied elevations from 26 to 101 m (85-330 feet). Soils are permanently inundated, nearly level, somewhat poorly drained to very poorly drained silt loams and mucky silty clay loams in the Limerick-Saco, Massena, and Madalin series (NRCS 2004). The underlying bedrock is sandstone, siltstone, and shale in the Austin Glen, Mt. Merino, and Canajoharie formations. Surrounding and adjacent natural communities include palustrine types, such as Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), Southern New England Red Maple Seepage Swamp (CEGL006406), Common Buttonbush Shrub Swamp (CEGL006069), Purple Loosestrife Wetland (CEGL006403), Common Duckweed Herbaceous Vegetation (CEGL005451), and Eastern Cattail Marsh (CEGL006153), as well as upland forests, including Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), and Northern Red Oak - Northern Hardwood Forest (CEGL006173).

Vegetation Description: The vegetation of this permanently ponded association is dominated by emergent aquatic species, which can have up to 60% cover. *Sparganium eurycarpum* (broadfruit bur-reed) and *Peltandra virginica* (green arrow arum) are codominant with lesser amounts of *Phalaris arundinacea* (reed canarygrass), *Pontederia cordata* (pickerelweed), and *Sagittaria latifolia* (broadleaf arrowhead). The floating aquatic layer has 30% cover and consists primarily of *Lemna minor* (common duckweed) with scattered *Spirodela polyrrhiza* (common duckmeat). *Elodea canadensis* (Canadian waterweed), a submerged aquatic species, also occurs sporadically. Overhanging trees and shrubs are not diagnostic and can vary from one pond to the next. Tree canopy species documented at Saratoga include *Quercus bicolor* (swamp white oak), *Fraxinus pennsylvanica* (green ash), and *Carya cordiformis* (bitternut hickory). The tall-shrub layer, composed of species rooted at the edges of the water, has 5% cover and is dominated by *Cephalanthus occidentalis* (common buttonbush) with scattered *Acer saccharinum* (silver maple). *Cornus amomum* (silky dogwood) and *Alnus incana ssp. rugosa* (speckled alder) make up the sparse short-shrub layer.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Quercus bicolor* (swamp white oak)

Tall shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Short shrub/sapling	Broad-leaved deciduous shrub	*Alnus incana* ssp. *rugosa* (speckled alder), *Cornus amomum* (silky dogwood)
Herb (field)	Forb	*Peltandra virginica* (green arrow arum), *Sparganium eurycarpum* (broadfruit bur-reed)
Herb (field)	Graminoid	*Phalaris arundinacea* (reed canarygrass)
Floating aquatic	Aquatic herb (floating & submergent)	*Lemna minor* (common duckweed)
Submerged aquatic	Aquatic herb (floating & submergent)	*Elodea canadensis* (Canadian waterweed)

Characteristic Species: *Peltandra virginica* (green arrow arum), *Sagittaria latifolia* (broadleaf arrowhead), *Sparganium eurycarpum* (broadfruit bur-reed)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Deep emergent marsh	Edinger et al. 2002

Local Range: This community is located on the Bemis Heights floodplain in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.7, SARA.103, SARA.158, SARA.169
Accuracy Assessment Observations: SARA.143 (AA), SARA.212 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Freshwater Marsh Group (G125)
Alliance*	*Pontederia cordata - Peltandra virginica* Semipermanently Flooded Herbaceous Alliance (A.1669)

Alliance (English name)*	Pickerelweed - Green Arrow-arum Semipermanently Flooded Herbaceous Alliance
Association	*Pontederia cordata - Peltandra virginica - Sagittaria latifolia* Herbaceous Vegetation
Association (English name)	Pickerelweed - Green Arrow-arum - Broadleaf Arrowhead Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Freshwater Marsh (CES201.594)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: Emergent marsh dominated by broad-leaved, aerenchymatous plants along pondshores, lakeshores, impoundments, and quiet riverbanks in the northeastern United States and elsewhere. This marsh occurs in shallow to deep standing water usually on muck soils. Common species include *Pontederia cordata* (pickerelweed), *Sagittaria latifolia* (broadleaf arrowhead), *Peltandra virginica* (green arrow arum), and *Sparganium* (bur-reed) spp. Additional emergent species include *Eleocharis palustris* (common spikerush), *Schoenoplectus tabernaemontani* (softstem bulrush), *Acorus calamus* (calamus), *Nuphar lutea ssp. variegata* (varigated yellow pond-lily), *Nymphaea odorata* (American white waterlily), *Sium suave* (hemlock waterparsnip), and submerged species including *Ceratophyllum demersum* (coon's tail) and *Utricularia macrorhiza* (common bladderwort).

Environmental Description: This association occurs along pondshores, lakeshores, impoundments, and quiet riverbanks in shallow to deep standing water usually on muck soils.

Vegetation Description: Common species include *Pontederia cordata* (pickerelweed), *Sagittaria latifolia* (broadleaf arrowhead), *Peltandra virginica* (green arrow arum), and *Sparganium* (bur-reed) spp. Additional emergent species include *Eleocharis palustris* (common spikerush), *Schoenoplectus tabernaemontani* (softstem bulrush), *Acorus calamus* (calamus), *Nuphar lutea ssp. variegata* (varigated yellow pond-lily), *Nymphaea odorata* (American white waterlily), *Sium suave* (hemlock waterparsnip), and submerged species including *Ceratophyllum demersum* (coon's tail) and *Utricularia macrorhiza* (common bladderwort).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Peltandra virginica* (green arrow arum), *Pontederia cordata* (pickerelweed), *Sagittaria latifolia* (broadleaf arrowhead)

Characteristic Species: *Peltandra virginica* (green arrow arum), *Pontederia cordata* (pickerelweed), *Sagittaria latifolia* (broadleaf arrowhead)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This association occurs in the northeastern United States.

States/Provinces: CT, MA, ME, NH, NJ, NY, PA, RI, VT

Federal Lands: NPS (Cape Cod, Saratoga); USFWS (Great Meadows, Great Swamp?)

CONSERVATION STATUS

Rank: G5 (19-Jan-2006)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Information not available.

Similar Associations:

Peltandra virginica - Pontederia cordata Tidal Herbaceous Vegetation (CEGL004706)

Related Concepts:

Deep Rush Marsh (Thompson 1996) B

Palustrine Broad-leaved Nonpersistent Emergent Wetland, Permanently Flooded (PEM4H) (Cowardin et al. 1979) ?

Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?

Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

SOURCES

Description Authors: S.L. Neid

References: Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Fike 1999, Gawler 2002, Metzler and Barrett 2001, NRCS 2004, Rawinski 1984, Sperduto 2000a, Swain and Kearsley 2000, Thompson 1996, Thompson and Sorenson 2000



Figure F-42. Northeastern Leafy Forb Marsh in the Old Saratoga Unit - *Peltandra virginica* (green arrow arum), *Pontederia cordata* (pickerelweed) dominant (plot SARA.158, NYNHP AA03, photo no. 532). 7/20/2004. NAD 1983 / UTM easting 615659, northing 4772657.



Figure F-43. Northeastern Leafy Forb Marsh in the Saratoga Battlefield Unit - Sparganium eurycarpum (broadfruit bur-reed) dominant (plot SARA.103, NYNHP SF3, photo no. 556). 7/21/2004. NAD 1983 / UTM easting 612115, northing 4759337.

Local Name: Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)

SYNONYMS

USNVC English Name:	**Rice Cutgrass - Fowl Mannagrass - (Clubrush species, Orange Jewelweed) Herbaceous Vegetation**
USNVC Scientific Name:	***Leersia oryzoides* - *Glyceria striata* - *(Schoenoplectus* spp.*, Impatiens capensis)* Herbaceous Vegetation**
USNVC Identifier:	**CEGL005106**

LOCAL INFORMATION

Environmental Description: This permanently inundated community occurs in two locations at Saratoga, one at 29 m (95 feet) in elevation in the abandoned Old Champlain Canal on the Hudson River floodplain and the other between 82 and 85 m (270-280 feet) in elevation northeast of the Barber Wheatfield overlook. In both cases, aspect is largely southeast and east. Soils is moderately well-drained to very poorly drained silt loam in the Hudson, Limerick-Saco complex, and Teel series (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. In the Old Champlain Canal site, Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575) borders this association on the east (downslope) and White Pine Successional Forest (CEGL007944) borders it on the west (upslope). At the higher elevation site, surrounding communities are Little Bluestem Old Field (CEGL006333), Northeastern Old Field (CEGL006107), Northeastern Successional Shrubland (CEGL006451), and White Pine Successional Forest (CEGL007944).

Vegetation Description: The vegetation of this herbaceous association is dominated by *Leersia oryzoides* (rice cutgrass) with *Scirpus atrovirens* (green bulrush) and *Impatiens capensis* (jewelweed) occurring as fairly consistent associates. Additional associated species are *Typha latifolia* (broadleaf cattail), *Onoclea sensibilis* (sensitive fern), *Verbena hastata* (swamp verbena), *Mimulus ringens* (Allegheny monkeyflower), *Eupatorium maculatum* (spotted joepyeweed), *Thelypteris palustris* (eastern marsh fern), *Polygonum sagittatum* (arrowleaf tearthumb), *Bidens connata* (purplestem beggarticks), *Eupatorium perfoliatum* (common boneset), *Polygonum hydropiperoides* (swamp smartweed), and *Juncus effusus* (common rush). Scattered tall shrubs (just over 2 m tall) can also be present; *Rhamnus cathartica* (common buckthorn) is the most abundant species.

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhamnus cathartica* (common buckthorn)
Herb (field)	Graminoid	*Leersia oryzoides* (rice cutgrass), *Scirpus atrovirens* (green bulrush), *Typha latifolia* (broadleaf cattail)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Impatiens capensis* (jewelweed), *Leersia oryzoides* (rice cutgrass), *Scirpus atrovirens* (green bulrush)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.75
Accuracy Assessment Observations: SARA.158 (AA)
Reference Observations: SARA.227, SARA.228
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Freshwater Marsh Group (G125)
Alliance*	*Leersia oryzoides - Glyceria striata* Seasonally Flooded Herbaceous Alliance (A.1399)
Alliance (English name)*	Rice Cutgrass - Fowl Mannagrass Seasonally Flooded Herbaceous Alliance
Association	*Leersia oryzoides - Glyceria striata - (Schoenoplectus* spp., *Impatiens capensis)* Herbaceous Vegetation
Association (English name)	Rice Cutgrass - Fowl Mannagrass - (Clubrush species, Orange Jewelweed) Herbaceous Vegetation
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: Information not available.
Environmental Description: Information not available.
Vegetation Description: Information not available.
Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: Palustrine

DISTRIBUTION

Range: Information not available.

States/Provinces: NY, ON
Federal Lands: NPS (Saratoga)
CONSERVATION STATUS
Rank: GNR (15-Dec-1994)
Reasons: Information not available.
CLASSIFICATION INFORMATION
Status: Standard
Confidence: 3 - Weak
Comments: Type concept is taken from the southern Ontario list of vegetation types by Lee et al. (1998) and needs rangewide review.
Similar Associations: Information not available.
Related Concepts: Information not available.
SOURCES
Description Authors: G.J. Edinger and A.L. Feldmann
References: Lee et al. 1998, Midwestern Ecology Working Group n.d., NRCS 2004



Figure F-44. Rice Cutgrass - Fowl Mannagrass Wet Meadow in the Saratoga Battlefield Unit (AA point SARA.158, NYNHP 315). 8/17/2006. NAD 1983 / UTM easting 610208, northing 4761265.

Local Name: Wild Rice Marsh (CEGL002382)

SYNONYMS

USNVC English Name: **(Annual Wild Rice, Northern Wild Rice) Herbaceous Vegetation**
USNVC Scientific Name: ***Zizania (aquatica, palustris)*** **Herbaceous Vegetation**
USNVC Identifier: **CEGL002382**

LOCAL INFORMATION

Environmental Description: This wild rice marsh is found on the shoreline of the Hudson River at 27 m (90 feet) in elevation. The association is permanently inundated and is located between Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575) and the main stream channel.

Vegetation Description: This association is dominated almost entirely by the tall emergent aquatic *Zizania aquatica* (annual wildrice), which has about 70% cover. Floating aquatic cover is relatively sparse; *Nymphaea odorata* (American white waterlily) is the most abundant species with lesser amounts of *Trapa natans* (water chestnut) and *Lemna minor* (common duckweed). The submerged aquatic *Vallisneria americana* (American eelgrass) also occurs at low abundance.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Zizania aquatica* (annual wildrice)
Floating aquatic	Aquatic herb (floating & submergent)	*Nymphaea odorata* (American white waterlily)
Submerged aquatic	Aquatic herb (floating & submergent)	*Vallisneria americana* (American eelgrass)

Characteristic Species: *Zizania aquatica* (annual wildrice)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Deep emergent marsh	Edinger et al. 2002

Local Range: This association is not found within the park. It is located outside of the park boundary in the mapped area surrounding the Battlefield Unit.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.108

Accuracy Assessment Observations: None

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Wet Meadow and Marsh (M069)
Group	Eastern North American Freshwater Marsh Group (G125)
Alliance*	*Zizania (aquatica, palustris)* Semipermanently Flooded Herbaceous Alliance (A.1441)
Alliance (English name)*	(Indian Wild Rice, Northern Wild Rice) Semipermanently Flooded Herbaceous Alliance
Association	*Zizania (aquatica, palustris)* Herbaceous Vegetation
Association (English name)	(Indian Wild Rice, Northern Wild Rice) Herbaceous Vegetation
Ecological System(s)	Laurentian-Acadian Freshwater Marsh (CES201.594) North-Central Interior Freshwater Marsh (CES202.899)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This wild rice marsh community is found in the upper midwestern United States and adjacent Canada. Stands are found in deeper, sheltered waters of slow-moving streams, protected bays, and flowage lakes, particularly at stream mouths. Water depths generally exceed 0.5 m. Substrate is rich sedimentary peat, or mucky, silty soils. A thick mat of rice stalks often covers the bottom. The marsh is dominated almost entirely by the tall emergent graminoids *Zizania aquatica* (annual wildrice) or *Zizania palustris* (northern wildrice). Floating-leaved and submerged aquatic cover can be high, but species composition is variable. Species include *Ceratophyllum demersum* (coon's tail), *Nuphar lutea ssp. variegata* (varigated yellow pond-lily), *Potamogeton natans* (floating pondweed), *Potamogeton zosteriformis* (flatstem pondweed), *Spirodela polyrrhiza* (common duckmeat), *Utricularia macrorhiza* (common bladderwort), and others.

Environmental Description: Stands are found in deeper, sheltered waters of slow-moving streams, protected bays, and flowage lakes, particularly at stream mouths. Water depths generally exceed 0.5 m. Substrate is rich sedimentary peat, or mucky, silty soils. A thick mat of rice stalks often covers the bottom (Voss 1972, Harris et al. 1996).

Vegetation Description: This marsh is dominated almost entirely by the tall emergent graminoids *Zizania aquatica* (annual wildrice) or *Zizania palustris* (northern wildrice). Floating-leaved and submerged aquatic cover can be high, but species composition is variable. Species include *Ceratophyllum demersum* (coon's tail), *Nuphar lutea ssp. variegata* (varigated yellow pond-lily), *Potamogeton natans* (floating pondweed), *Potamogeton zosteriformis* (flatstem pondweed), *Spirodela polyrrhiza* (common duckmeat), *Utricularia macrorhiza* (common bladderwort), and others (Harris et al. 1996).

Most Abundant Species: Information not available.

Characteristic Species: Information not available.

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This wild rice marsh community is found in the upper midwestern and northeastern United States and adjacent Canada, ranging from Vermont and New York to Minnesota and Manitoba, south to Iowa and Indiana.

States/Provinces: IA:SU, IN, MB?, MI, MN, NY, ON, VT:S3, WI:S3

Federal Lands: NPS (Saratoga?, Voyageurs); USFS (Chequamegon-Nicolet, Chippewa, Nicolet, Ottawa?)

CONSERVATION STATUS

Rank: G3G4 (21-Jan-2000)

Reasons: In southern Wisconsin, this type has been greatly reduced by drainage of wetlands. Augmentation of the type through planting makes it difficult to distinguish natural stands from cultural stands.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: Taxonomy of wild rice is somewhat indeterminate. *Zizania aquatica* (annual wildrice) may be more common in southern stands and *Zizania palustris* (northern wildrice) in more northern stands. Stands of this type may have cultural origins, as wild rice was an important food source for Native Americans (Voss 1972). In northeastern Minnesota and Wisconsin, commercial operators and agency wildlife managers may establish stands by seeding directly into natural open water marsh systems (Chel Anderson pers. comm. 1998, E. Epstein pers. comm. 1999). These *Zizania* (wildrice) species are actually annual grasses, so technically they should be placed in a "Permanently flooded temperate annual grassland" formation (V.D.2.N.x), but they are left with their other perennial associates for clarity.

Similar Associations:

Zizania aquatica Tidal Herbaceous Vegetation (CEGL004202)

Related Concepts:

Marsh: wild rice: organic substrate (W9) (Harris et al. 1996) =

SOURCES

Description Authors: D. Faber-Langendoen

References: Greenall 1996, Harris et al. 1996, INAI unpubl. data, Midwestern Ecology Working Group n.d., NRCS 2004, Thompson and Sorenson 2000, Voss 1972, WNHIP unpubl. Data



Figure F-45. Wild Rice Marsh in the Saratoga Battlefield Unit (plot SARA.108, NYNHP SF8, photo no. 562). 7/21/2004. NAD 1983 / UTM easting 612106, northing 4758988.

Local Name: Common Buttonbush Shrub Swamp (CEGL006069)

SYNONYMS

USNVC English Name: **Common Buttonbush - Swamp-loosestrife Shrubland**
USNVC Scientific Name: ***Cephalanthus occidentalis - Decodon verticillatus* Shrubland**
USNVC Identifier: **CEGL006069**

LOCAL INFORMATION

Environmental Description: This saturated to permanently inundated shrub swamp occurs on flats adjacent to stream and river channels as well as in high, level depressions. It can be found at elevations ranging from 26 to 69 m (85-225 feet). Soils are very deep, moderately well-drained to very poorly drained loamy sands, loamy fine sands, and silt loams in the Wareham, Oakville, Limerick-Saco complex, and Teel series (NRCS 2004). The underlying bedrock is shale in the Canajoharie Formation. This community is commonly part of a larger wetland complex, and accordingly, adjacent communities include Southern New England Red Maple Seepage Swamp (CEGL006406), Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Northeastern Leafy Forb Marsh (CEGL006191), Reed Canarygrass Eastern Marsh (CEGL006044), and Common Duckweed Herbaceous Vegetation (CEGL005451), as well as Little Bluestem Old Field (CEGL006333), Bracken Grassland (CEGL005142), and cropland/pasture.

Vegetation Description: *Cephalanthus occidentalis* (common buttonbush) is a dominant and characteristic tall and short shrub, accompanied by *Salix lucida* (shining willow) and *Ilex verticillata* (common winterberry) in both shrub layers and by *Alnus incana ssp. rugosa* (speckled alder) in the tall-shrub layer and *Alnus serrulata* (hazel alder) in the short-shrub layer. Tall shrubs reach nearly 3 m tall and have 20% cover; short shrubs are less than 2 m tall and have over 60% cover. Scattered canopy (18 m tall) and subcanopy (8 m tall) trees are present; *Acer saccharinum* (silver maple) is the most abundant species in both layers with associated *Fraxinus pennsylvanica* (green ash) in the canopy. Herbaceous species are also sparse and include *Thelypteris palustris* (eastern marsh fern), *Peltandra virginica* (green arrow arum), *Onoclea sensibilis* (sensitive fern), *Carex gynandra* (nodding sedge), *Bidens connata* (purplestem beggarticks), *Symplocarpus foetidus* (skunk cabbage), and *Solanum dulcamara* (climbing nightshade). Emergent aquatic herbs, present at low abundance, include *Phalaris arundinacea* (reed canarygrass), *Peltandra virginica* (green arrow arum), *Sparganium eurycarpum* (broadfruit bur-reed), *Leersia oryzoides* (rice cutgrass), and *Sagittaria latifolia* (broadleaf arrowhead). Reaching just over 30% cover, floating aquatic species include *Spirodela polyrrhiza* (common duckmeat), *Lemna minor* (common duckweed), *Wolffia brasiliensis* (Brazilian watermeal), and *Potamogeton epihydrus* (ribbonleaf pondweed). *Ceratophyllum demersum* (coon's tail), a submerged aquatic, is sporadically present.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Acer saccharinum* (silver maple)

Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Forb	*Peltandra virginica* (green arrow arum), *Sparganium eurycarpum* (broadfruit bur-reed)
Herb (field)	Graminoid	*Leersia oryzoides* (rice cutgrass), *Phalaris arundinacea* (reed canarygrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern)
Floating aquatic	Aquatic herb (floating & submergent)	*Lemna minor* (common duckweed), *Spirodela polyrrhiza* (common duckmeat)
Submerged aquatic	Aquatic herb (floating & submergent)	*Ceratophyllum demersum* (coon's tail)

Characteristic Species: *Cephalanthus occidentalis* (common buttonbush), *Sparganium eurycarpum* (broadfruit bur-reed), *Spirodela polyrrhiza* (common duckmeat)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shrub Swamp	Edinger et al. 2002

Local Range: This community is located in both the Old Saratoga Unit (in the Schuyler House parcel) and the Battlefield Unit of Saratoga National Historical Park and extends onto the mapped areas outside the park boundaries.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.3, SARA.8, SARA.104, SARA.167, SARA.171
Accuracy Assessment Observations: SARA.130 (AA), SARA.142 (AA), SARA.183 (AA), SARA.191 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Northern and Central Tall Shrub Wetland (M160)
Group	Northern and Central Shrub Swamp Group (G167)

Alliance*	*Cephalanthus occidentalis* Semipermanently Flooded Shrubland Alliance (A.1011)
Alliance (English name)*	Common Buttonbush Semipermanently Flooded Shrubland Alliance
Association	*Cephalanthus occidentalis - Decodon verticillatus* Shrubland
Association (English name)	Common Buttonbush - Swamp-loosestrife Shrubland
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587)
	Central Appalachian River Floodplain (CES202.608)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This buttonbush swamp occurs in the northeastern United States. These swamps experience prolonged or semipermanent flooding for much of the growing season, with water tables receding below the soil surface only during drought or very late in the growing season. They occur in a variety of environmental settings, including backwater sloughs or oxbow ponds, wet swales in floodplains, pond and lake borders, and small, isolated depressions where water levels recede very slowly, such as those with perched water tables. The substrate is typically loose muck. *Cephalanthus occidentalis* (common buttonbush) is dominant and often monotypic. Occasional associates depend on the environmental setting and most often occur in drier areas. They include *Vaccinium corymbosum* (highbush blueberry), *Rhododendron viscosum* (swamp azalea), *Acer rubrum* (red maple), *Cornus* (dogwood) spp. closer to upland borders, or *Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash), and *Viburnum dentatum* (southern arrowwood) where adjacent to floodplains, or *Decodon verticillatus* (swamp loosestrife), *Chamaedaphne calyculata* (leatherleaf), and *Spiraea alba var. latifolia* (white meadowsweet) in more stagnant basins. Herbaceous species tend to be sparse but can include *Glyceria canadensis* (rattlesnake mannagrass), *Dulichium arundinaceum* (threeway sedge), *Carex stricta* (upright sedge), *Scirpus cyperinus* (woolgrass), *Thelypteris palustris* (eastern marsh fern), *Leersia oryzoides* (rice cutgrass), *Acorus calamus* (calamus), *Alisma plantago-aquatica* (American waterplantain), *Polygonum* (knotweed) spp., *Sparganium* (bur-reed) spp., and floating or submerged aquatic species such as *Lemna minor* (common duckweed), *Potamogeton natans* (floating pondweed), and *Nuphar lutea ssp. variegata* (varigated yellow pond-lily). Bryophytes, if present, cling to shrub bases and include *Warnstorfia fluitans* (warnstorfia moss), *Drepanocladus aduncus* (drepanocladus moss), or *Sphagnum fallax* (sphagnum). In disturbed areas, these wetland may be invaded by *Lythrum salicaria* (purple loosestrife).

Environmental Description: This association includes buttonbush swamps that experience prolonged or semipermanent flooding for much of the growing season with water tables receding below the soil surface only during drought or very late in the growing season. They occur in a variety of environmental settings including backwater sloughs or oxbow ponds, wet swales in floodplains, pond and lake borders, and small, isolated depressions where water levels recede very slowly, such as those with perched water tables. Soils are often organic mucks or silt loams.

Vegetation Description: This association includes buttonbush swamps of the eastern and northeastern United States. These swamps experience prolonged or semipermanent flooding for much of the growing season with water tables receding below the soil surface only during drought or very late in the growing season. They occur in a variety of environmental settings including backwater sloughs or oxbow ponds, wet swales in floodplains, pond and lake borders, and small

isolated depressions where water levels recede very slowly, such as those with perched water tables. *Cephalanthus occidentalis* (common buttonbush) is dominant and often monotypic. Scattered *Acer rubrum* (red maple) trees may be present in the wetland. Occasional associates depend on the environmental setting, and some only occur in drier areas. They include *Vaccinium corymbosum* (highbush blueberry), *Rhododendron viscosum* (swamp azalea), *Acer rubrum* (red maple), *Salix* (willow) spp., *Cornus amomum* (silky dogwood) or *Cornus sericea* (redosier dogwood) closer to upland borders, or *Acer saccharinum* (silver maple), *Fraxinus pennsylvanica* (green ash), or *Viburnum dentatum* (southern arrowwood) where adjacent to floodplains, or *Decodon verticillatus* (swamp loosestrife), *Chamaedaphne calyculata* (leatherleaf), and *Spiraea alba var. latifolia* (white meadowsweet) in more stagnant basins. Herbaceous species tend to be sparse but can include *Glyceria canadensis* (rattlesnake mannagrass), *Dulichium arundinaceum* (threeway sedge), *Carex stricta* (upright sedge), *Scirpus cyperinus* (woolgrass), *Osmunda regalis* (royal fern), *Thelypteris palustris* (eastern marsh fern), *Bidens* (beggarticks) spp., *Sium suave* (hemlock waterparsnip), *Scutellaria lateriflora* (blue skullcap), *Alisma plantago-aquatica* (American waterplantain), *Polygonum* (knotweed) spp., *Sparganium* (bur-reed) spp., and floating or submerged aquatic species such as *Lemna minor* (common duckweed), *Potamogeton natans* (floating pondweed), and *Nuphar lutea ssp. variegata* (varigated yellow pond-lily). Bryophytes, if present, cling to shrub bases and include *Warnstorfia fluitans* (warnstorfia moss), *Drepanocladus aduncus* (drepanocladus moss), or *Sphagnum fallax* (sphagnum).

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Graminoid	*Dulichium arundinaceum* (threeway sedge)

Characteristic Species: *Cephalanthus occidentalis* (common buttonbush), *Dulichium arundinaceum* (threeway sedge), *Osmunda regalis* (royal fern), *Sparganium americanum* (American bur-reed), *Vaccinium corymbosum* (highbush blueberry)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This association is found throughout the northeastern United States (an estimated 450,000 square km based on subsection attribution).

States/Provinces: CT, DE, MA, MD, ME, NH, NJ, NY, PA, RI, VA, VT, WV?

Federal Lands: NPS (Boston Harbor Islands, Cape Cod, Delaware Water Gap, Minute Man, Saratoga, Weir Farm); USFWS (Assabet River?, Chesapeake Marshlands, Great Meadows, Great Swamp, Oxbow)

CONSERVATION STATUS

Rank: G4G5 (31-Jan-2007)

Reasons: This association is widely distributed in the northeastern U.S. and relatively common in its small-patch setting. It is vulnerable to groundwater disruption, agricultural runoff, and adjacent forest clearing.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: This type may be synonymous with *Cephalanthus occidentalis / Carex* spp. Northern Shrubland (CEGL002190), although it also ranges south of the glaciation boundary in the east. CEGL002190 is distributed from the Western Allegheny Plateau (TNC Ecoregion 49) and Great Lakes (TNC Ecoregion 48) west to the Central Tallgrass Prairie (TNC Ecoregion 36), while this type occurs from the Central Appalachian Forest (TNC Ecoregion 59) and High Allegheny Plateau (TNC Ecoregion 60) east.

Similar Associations:

Cephalanthus occidentalis - (Leucothoe racemosa) / Carex joorii Shrubland (CEGL004075)
Cephalanthus occidentalis / Carex spp. - *Lemna* spp. Southern Shrubland (CEGL002191)
Cephalanthus occidentalis / Carex spp. Northern Shrubland (CEGL002190)

Related Concepts:

Buttonbush Swamp (Kettle Basin Shrub Swamp) (Thompson 1996) ?
Buttonbush semipermanently flooded shrub swamp (CAP pers. comm. 1998) ?
Palustrine Broad-leaved Deciduous Scrub-Shrub Wetland, Seasonally Flooded (PSS1C) (Cowardin et al. 1979) ?

SOURCES

Description Authors: S.L. Neid, mod. E. Southgate, L.A. Sneddon, S.C. Gawler, E. Largay

References: Bowman 2000, Breden et al. 2001, CAP pers. comm. 1998, Cowardin et al. 1979, Eastern Ecology Working Group n.d., Edinger et al. 2002, Elliman 2003, Enser 1999, Fike 1999, Fleming et al. 2001, Gawler 2002, Harrison 2004, Hopping 2000, J. Harrison pers. comm., Karanaukas 2001, Metzler and Barrett 2001, NRCS 2004, Nichols et al. 2001, Sperduto 2000b, Swain and Kearsley 2001, Thompson 1996, Thompson and Sorenson 2000



Figure F-46. Common Buttonbush Shrub Swamp in the Saratoga Battlefield Unit (plot SARA.104, NYNHP SF4, photo no. 558). 7/21/2004. NAD 1983 / UTM easting 612087, northing 4759297.

Local Name: Speckled Alder Swamp (CEGL002381)

SYNONYMS

USNVC English Name: Speckled Alder Swamp Shrubland
USNVC Scientific Name: *Alnus incana* Swamp Shrubland
USNVC Identifier: CEGL002381

LOCAL INFORMATION

Environmental Description: This seasonally flooded shrubland occurs in wet depressions at widely varying elevations, from 27 to 116 m (90-380 feet). It develops on soils that are very deep, well-drained to very poorly drained and composed of silt loam, channery silt loam, fine sandy loam, and mucky silty clay loam in the Rhinebeck, Manlius-Nassau complex, Hudson, Tioga, Teel, and Madalin series (NRCS 2004). Underlying bedrock is shale, siltstone, and sandstone in the Austin Glen, Mt. Merino, and Canajoharie formations. Commonly, the community is surrounded by cropland/pastureland; adjacent natural communities include Northeastern Old Field (CEGL006107), Early-Successional Woodland/Forest (CEGL006303), Northeastern Oak - Red Maple Successional Forest (CEGL006506), Eastern Cattail Marsh (CEGL006153), Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Mesic Sugar Maple - Ash - Oak - Hickory Forest (CEGL006046), and White Pine - Oak Forest (CEGL006293).

Vegetation Description: This palustrine association is characterized by a predominance of *Alnus incana ssp. rugosa* (speckled alder) in the shrub and subcanopy layers. The subcanopy reaches 7 m tall and has 30% cover, almost solely consisting of *Alnus incana ssp. rugosa* (speckled alder); the tall and short-shrub layers are codominated by *Cornus amomum* (silky dogwood) and *Alnus incana ssp. rugosa* (speckled alder) with *Lonicera tatarica* (Tatarian honeysuckle). An open tree canopy (25 m tall with 30% cover) is dominated by *Populus tremuloides* (quaking aspen). The herbaceous layer is somewhat dense, with 60% cover, and is dominated by the fern *Onoclea sensibilis* (sensitive fern) with lesser amounts of *Thelypteris palustris* (eastern marsh fern), *Athyrium filix-femina* (common ladyfern), *Carex vulpinoidea* (fox sedge), *Juncus effusus* (common rush), and *Eupatorium perfoliatum* (common boneset). *Parthenocissus quinquefolia* (Virginia creeper) is the most common vine.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Populus tremuloides* (quaking aspen)
Tree subcanopy	Broad-leaved deciduous tree	*Alnus incana* ssp. *rugosa* (speckled alder)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Cornus amomum* (silky dogwood)
Tall shrub/sapling	Broad-leaved deciduous shrub	*Alnus incana* ssp. *rugosa* (speckled alder)
Herb (field)	Vine/Liana	*Parthenocissus quinquefolia* (Virginia creeper)

Herb (field) Fern or fern ally *Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Alnus incana* ssp. *rugosa* (speckled alder), *Cornus amomum* (silky dogwood), *Onoclea sensibilis* (sensitive fern)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shrub Swamp	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit at Saratoga National Historical Park as well as in the mapped area outside the park boundary.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: SARA.22 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Northern and Central Tall Shrub Wetland (M160)
Group	Northern and Central Shrub Swamp Group (G167)
Alliance*	*Alnus incana* Seasonally Flooded Shrubland Alliance (A.986)
Alliance (English name)*	Speckled Alder Seasonally Flooded Shrubland Alliance
Association	*Alnus incana* Swamp Shrubland
Association (English name)	Speckled Alder Swamp Shrubland
Ecological System(s)	Laurentian-Acadian Floodplain Forest (CES201.587) Western Great Plains Open Freshwater Depression Wetland (CES303.675) Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582) High Allegheny Wetland (CES202.069)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This alder swamp community type is widespread in the midwestern and northeastern United States and southern Canada. Stands occur on shores, edges of beaver meadows in stream floodplains, swales associated with small streams in peatlands, or upland forests. Soils are well-decomposed peat, muck or mineral soils. The hydrology is typically seasonally flooded, with most sites remaining saturated. The vegetation is dominated by tall shrubs, 2-8 m in height, with a moderately open to dense shrub canopy. There is an understory of shorter shrubs and herbaceous species. The density of the understory varies inversely with the tall-shrub canopy. The overstory is usually overwhelmingly dominated by *Alnus incana* (gray alder), but in the more southeastern

portions of this type's range, *Alnus serrulata* (hazel alder) can occur with *Alnus incana* (gray alder). Where alder is not as dominant, other shrubs, such as *Cornus sericea* (redosier dogwood), *Ilex verticillata* (common winterberry), *Rubus idaeus* (American red raspberry), *Salix* (willow) spp., *Spiraea alba* (white meadowsweet), *Spiraea tomentosa* (steeplebush), and *Viburnum* (viburnum) spp., can be found. At the southern range limit of this type in West Virginia, shrub layers may by be dominated or codominated by the central Appalachian endemic *Ilex collina* (longstalk holly). The herbaceous layer contains species such as *Symphyotrichum lanceolatum var. lanceolatum* (white panicle aster), *Symphyotrichum puniceum* (purplestem aster), *Calamagrostis canadensis* (bluejoint), *Caltha palustris* (yellow marsh marigold), *Carex lacustris* (lake sedge), *Carex prairea* (prairie sedge), *Carex trisperma* (threeseeded sedge), *Doellingeria umbellata* (parasol whitetop), *Eupatorium maculatum* (spotted joepyeweed), *Glyceria melicaria* (melic mannagrass), *Glyceria striata* (fowl mannagrass), *Impatiens capensis* (jewelweed), *Lycopus uniflorus* (northern bugleweed), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Rubus pubescens* (dwarf red blackberry), *Scirpus atrovirens* (green bulrush), *Symplocarpus foetidus* (skunk cabbage), *Thelypteris palustris* (eastern marsh fern), *Typha* (cattail) spp., and *Viola* (violet) spp. Mosses include *Climacium dendroides* (tree climacium moss) and *Sphagnum* (sphagnum) spp. Where the tall-shrub canopy is open, the graminoids can become dense. Scattered trees are found in many stands, including *Acer rubrum* (red maple), *Fraxinus nigra* (black ash), and *Thuja occidentalis* (arborvitae).

Environmental Description: Sites are typically along streams, lakeshores, edges of beaver meadows, swales associated with small streams in peatlands or upland forests, or near seeps. Most have little to no slope, but some sites are on moderate slopes. Hydrologic conditions can range from temporarily flooded to seasonally flooded, or even saturated, but are typically seasonally flooded/saturated. The water ranges from non-stagnant, nutrient-rich, and often slightly calcareous (Curtis 1959) to rather stagnant and nutrient-poor where over acidic bedrock or till. Soils are wet, often mucks or peats (Anderson 1982, Chapman et al. 1989). In the upper Midwest, this community is found on Precambrian Shield bedrock that is overlaid with sandy loam soils, which are moderately well-drained and deep (>60 cm). In northeastern Minnesota stands can occur on northeast- and south-facing slopes that are moderate to steep, with slopes ranging from 4 to 45% (Ohmann and Ream 1971). The climate is highly variable, with temperature extremes between -46 and 38 degrees C and 58-91 cm precipitation.

Vegetation Description: The vegetation is dominated by tall shrubs, 2-8 m in height, with a moderately open to dense shrub canopy. There is an understory of shorter shrubs and herbaceous species. The density of the understory varies inversely with the tall-shrub canopy. The overstory is usually overwhelmingly dominated by *Alnus incana* (gray alder), but in the more southeastern portions of this type's range, *Alnus serrulata* (hazel alder) can occur with *Alnus incana* (gray alder). Where alder is not as dominant, other shrubs, such as *Cornus sericea* (redosier dogwood), *Ilex verticillata* (common winterberry), *Rubus idaeus* (American red raspberry), *Salix* (willow) spp., *Spiraea alba* (white meadowsweet), *Spiraea tomentosa* (steeplebush), and *Viburnum* (viburnum) spp., can be found. The herbaceous layer contains species such as *Symphyotrichum lanceolatum var. lanceolatum* (white panicle aster), *Symphyotrichum puniceum* (purplestem aster), *Calamagrostis*

canadensis (bluejoint), *Caltha palustris* (yellow marsh marigold), *Carex lacustris* (lake sedge), *Carex prairea* (prairie sedge), *Carex trisperma* (threeseeded sedge), *Doellingeria umbellata* (parasol whitetop), *Eupatorium maculatum* (spotted joepyeweed), *Impatiens capensis* (jewelweed), *Lycopus uniflorus* (northern bugleweed), *Onoclea sensibilis* (sensitive fern), *Osmunda cinnamomea* (cinnamon fern), *Rubus pubescens* (dwarf red blackberry), *Scirpus atrovirens* (green bulrush), *Symplocarpus foetidus* (skunk cabbage), *Thelypteris palustris* (eastern marsh fern), *Typha* (cattail) spp., and *Viola* (violet) spp. Mosses include *Climacium dendroides* (tree climacium moss) and *Sphagnum* (sphagnum) spp. Where the tall-shrub canopy is open, the graminoids can become dense. Scattered trees are found in many stands, including *Acer rubrum* (red maple), *Fraxinus nigra* (black ash), and *Thuja occidentalis* (arborvitae) (Curtis 1959, Anderson 1982, MNNHP 1993, Harris et al. 1996, Sperduto 2000b, Thompson and Sorenson 2000, Gawler 2002). Where stands border on saturated conditions with peaty soils, peatland species such as *Chamaedaphne calyculata* (leatherleaf), *Rhododendron canadense* (rhodora), and *Sphagnum* (sphagnum) spp. may be present.

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Alnus incana* (gray alder)

Characteristic Species: *Alnus incana* (gray alder)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This alder swamp community type is widespread in the midwestern and northeastern United States and southern Canada, ranging from Maine west to Manitoba, south to Iowa, and east to New York and perhaps northern New Jersey.

States/Provinces: IA:S3?, IL, IN?, MA, MB?, ME, MI:S5, MN:S5, ND:S2?, NH:S3S4, NJ?:S2S4, NY, OH, ON, PA, VT, WI:S4, WV:S3

Federal Lands: NPS (Acadia, Apostle Islands, Isle Royale, Pictured Rocks, Saratoga, Upper Delaware, Voyageurs); USFS (Chequamegon, Chequamegon-Nicolet, Chippewa, Huron, Huron-Manistee, Manistee, Nicolet, Ottawa, Superior); USFWS (Aroostook, Assabet River, Carlton Pond, Moosehorn?, Nulhegan Basin)

CONSERVATION STATUS

Rank: G5 (23-Jun-2006)

Reasons: This association is widely distributed and considered secure in many states.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Type has a very broad distribution, and there may be a need to separate a northern (more boreal) type from a southern (more temperate) type, or perhaps an enriched versus lower-nutrient type, based on floristic differences. Hydrology may be quite variable, ranging from temporarily flooded to semipermanently flooded. In Ohio, this association sometimes merges with *Alnus serrulata* (hazel alder) stands in *Alnus serrulata* Swamp Shrubland (CEGL005082); that association

is distinguished by somewhat more southern associates, including *Rhododendron viscosum* (swamp azalea), *Lindera benzoin* (northern spicebush), *Peltandra virginica* (green arrow arum), etc.. With increasing tree canopy cover, this association can be similar to *Larix laricina* (tamarack) forest types, *Thuja occidentalis* (arborvitae) saturated forest types, and *Fraxinus nigra - Acer rubrum* saturated forest types.

Similar Associations:

Alnus incana - Cornus (amomum, sericea) / Clematis virginiana Shrubland (CEGL006062)
Alnus incana ssp. rugosa - Nemopanthus mucronatus / Sphagnum spp. Shrubland (CEGL006158)
Alnus serrulata Swamp Shrubland (CEGL005082)

Related Concepts:

Alnus incana - Sambucus canadensis shrub community (Darlington 1943) F
Alnus incana - Viburnum cassinoides shrub community (Darlington 1943) F
Alnus incana ssp. rugosa tall shrub thicket (Fortney et al. 2005) =
Alnus rugosa shrub (Walbridge and Lang 1982) =
Alnus rugosa tall shrub community (Robinette 1966) =
Alnus rugosa tall shrub community (Walbridge 1982) =
Alnus rugosa thicket community (Fortney 1975) =
Alder Shrub Swamp (Anderson and Barren 1991) =
Alder Thicket (Curtis 1959) =
Thicket Swamp: Speckled Alder / Bluejoint Grass type , W35 (Harris et al. 1996) =

SOURCES

Description Authors: D. Faber-Langendoen, mod. S.C. Gawler

References: Anderson 1982, Anderson and Barren 1991, Breden et al. 2001, Byers et al. 2007, Chapman 1986, Curtis 1959, Darlington 1943, DeMeo et al. 1998, Fortney 1975, Fortney et al. 2005, Gawler 2002, Greenall 1996, Harris et al. 1996, INAI unpubl. data, MNNHP 1993, Midwestern Ecology Working Group n.d., NDNHI n.d., NRCS 2004, Ohmann and Ream 1971, Rentch unpubl. data 2003, Robinette 1966, Sperduto 2000b, Swain and Kearsley 2001, Thompson and Sorenson 2000, WNHIP unpubl. data, Walbridge 1982, Walbridge and Lang 1982

Local Name: Common Reed Marsh (CEGL004141)

SYNONYMS

USNVC English Name: **Common Reed Eastern North America Temperate Semi-natural Herbaceous Vegetation**

USNVC Scientific Name: ***Phragmites australis*** **Eastern North America Temperate Semi-natural Herbaceous Vegetation**

USNVC Identifier: **CEGL004141**

LOCAL INFORMATION

Environmental Description: This marsh association is located at 91 m (300 feet) in elevation in a semipermanently flooded ditch between Northeastern Old Field (CEGL006107) and mowed roadside. Soil is silt loam in the Rhinebeck series which is very deep, gently sloping, and somewhat poorly drained (NRCS 2004). The underlying bedrock is siltstone and shale in the Mt. Merino Formation.

Vegetation Description: The herbaceous layer has nearly 95% cover and is strongly dominated by the invasive exotic *Phragmites australis* (common reed). Associated species are *Verbena hastata* (swamp verbena), *Penstemon digitalis* (talus slope penstemon), *Eupatorium maculatum* (spotted joepyeweed), *Lycopus americanus* (American water horehound), *Polygonum sagittatum* (arrowleaf tearthumb), and *Cyperus* (flatsedge) sp.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Phragmites australis* (common reed)

Characteristic Species: *Phragmites australis* (common reed)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Reedgrass marsh	Edinger et al. 2002

Local Range: This community is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: None

Accuracy Assessment Observations: SARA.178 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)

Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Ruderal Wet Meadow and Marsh (M303)
Group	Northern and Central Ruderal Wet Meadow and Marsh Group (G556)
Alliance*	*Phragmites australis* Semipermanently Flooded Herbaceous Alliance (A.1431)
Alliance (English name)*	Common Reed Semipermanently Flooded Herbaceous Alliance
Association	*Phragmites australis* Eastern North America Temperate Semi-natural Herbaceous Vegetation
Association (English name)	Common Reed Eastern North America Temperate Semi-natural Herbaceous Vegetation
Ecological System(s)	Southeastern Coastal Plain Interdunal Wetland (CES203.258) Northern Atlantic Coastal Plain Tidal Salt Marsh (CES203.519) Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582) Laurentian-Acadian Freshwater Marsh (CES201.594) North-Central Interior Freshwater Marsh (CES202.899)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL

DESCRIPTION

Concept Summary: This reed marsh type is found across the east-temperate regions of the United States and Canada. Stands occur in semipermanently flooded marshes, ditches, impoundments, etc., that have often been disturbed by human activity. The vegetation is variable, as *Phragmites australis* (common reed) will often invade into existing natural or semi-natural communities present on the site. Once firmly established, this community is usually strongly dominated by *Phragmites australis* (common reed), with few or no other vascular plants present.

Environmental Description: Stands occur in semipermanently flooded marshes, ditches, impoundments, etc. that have often been disturbed by human activity.

Vegetation Description: The vegetation is often variable, as *Phragmites australis* (common reed) will often invade into existing natural or semi-natural communities present on the site. Once firmly established, this community is usually strongly dominated by *Phragmites australis* (common reed), with few or no other vascular plants present.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Phragmites australis* (common reed)

Characteristic Species: *Phragmites australis* (common reed)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This reed marsh type is found across the east-temperate regions of the United States and Canada, ranging from Maine west to the eastern Dakotas and Manitoba, south to Texas and east to Florida.

States/Provinces: AL, AR, CT, DE, FL, GA, IA, IN, LA, MA, MD, ME, MI, MN, MS, NC, NH, NJ, NY, OH, ON, PA, RI, SC, TX, VA, VT, WI, WV

Federal Lands: NPS (Assateague Island, Boston Harbor Islands, Cape Cod, Indiana Dunes, Minute Man, Saratoga, Upper Delaware, Voyageurs); USFWS (Alligator River, Aransas, Bon Secour,

Brazoria, Great Dismal Swamp, Great Meadows, Great Swamp, Matagorda Island, Nomans Land Island?, Oxbow, Parker River, Prime Hook)

CONSERVATION STATUS

Rank: GNA (invasive) (23-Nov-1997)

Reasons: Although almost always occurring as a naturalized type that arises from human disturbance, some stands in northern Minnesota and further north in Canada may be native. If so, they should be tracked as a separate type.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 1 - Strong

Comments: This is not a native community but is the result of the invasion of alien *Phragmites australis* (common reed) into natural or semi-natural vegetation. The vegetation has variable hydrology and, unless *Phragmites* (reed) is clearly dominant, is often treated as part of other marsh and meadow types. The geographic distribution of the type is arbitrarily limited to Bailey's Humid Temperate Domain in eastern North America (Bailey 1997, 1998). Stands in northern Minnesota and farther north in Canada may represent native stands. If so, they should be tracked as a different type. Tidal vegetation of the Gulf Coast of Louisiana and Texas dominated by *Phragmites australis* (common reed) is classified in the *Phragmites australis* (common reed) Tidal Herbaceous Alliance (A.1477).

Similar Associations:

Phragmites australis Tidal Herbaceous Vegetation (CEGL004187)

Phragmites australis Western North America Temperate Semi-natural Herbaceous Vegetation (CEGL001475)

Related Concepts:

Phragmites australis community (Metzler and Barrett 1992) ?

Phragmites australis tidal marsh association (Clancy 1993b) ?

Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?

Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

SOURCES

Description Authors: D. Faber-Langendoen

References: Bailey 1997, Bailey 1998, Bell et al. 2002, Clancy 1993b, Harris et al. 1996, INAI unpubl. data, Metzler and Barrett 1992, Metzler and Barrett 2001, NRCS 2004, Nelson 1986, Rawinski 1984, Schafale and Weakley 1990, Schotz pers. comm., Southeastern Ecology Working Group n.d., Swain and Kearsley 2001



Figure F-47. Common Reed Marsh in the Saratoga Battlefield Unit (AA point SARA.178, NYNHP 353). 8/17/2006. NAD 1983 / UTM easting 610336, northing 4762289.

Local Name: Purple Loosestrife Wetland (CEGL006403)

SYNONYMS

USNVC English Name: Purple Loosestrife Herbaceous Vegetation
USNVC Scientific Name: *Lythrum salicaria* Herbaceous Vegetation
USNVC Identifier: CEGL006403

LOCAL INFORMATION

Environmental Description: This wetland association occurs in two patches at Saratoga National Historical Park, one at 27 m (90 feet) in elevation and the other at 52 m (170 feet). In both locations, the community occurs in flat settings within channel beds and is underlain by siltstone and shale bedrock in the Mt. Merino Formation. Soils are channery silt loam and silt loam in the Manlius-Nassau, Teel, and Limerick-Saco series. They are moderately deep to very deep, gently sloping, well-drained to very poorly drained, and were formed in recent alluvium and glacial till (NRCS 2004). Adjacent communities are Northeastern Leafy Forb Marsh (CEGL006191), midreach stream, mowed roadside/pathway, and flooded cropland.

Vegetation Description: This association's vegetation is characterized by dominance of the invasive exotic *Lythrum salicaria* (purple loosestrife) in the herbaceous layer. Additional herbaceous species found in the marsh are *Typha angustifolia* (narrowleaf cattail), *Onoclea sensibilis* (sensitive fern), *Equisetum pratense* (meadow horsetail), *Eupatorium maculatum* (spotted joepyeweed), and *Senna hebecarpa* (American senna). In combination, herbs can cover over 95% of the area. Scattered *Salix alba* (white willow) trees can occur in a canopy layer that reaches 20 m in height and has 10% cover. A sparse subcanopy layer, at 12 m tall, contains *Populus grandidentata* (bigtooth aspen), *Salix alba* (white willow), and *Fraxinus pennsylvanica* (green ash). The tall-shrub layer is moderately sparse, with 15% cover, and is dominated by *Lonicera tatarica* (Tatarian honeysuckle) with small amounts of *Fraxinus pennsylvanica* (green ash). Short shrubs are also moderately sparse and dominated by *Lonicera tatarica* (Tatarian honeysuckle). The vines *Vitis riparia* (riverbank grape) and *Toxicodendron radicans* (eastern poison ivy) are also present.

Most Abundant Species:

Stratum	Lifeform	Species
Tree canopy	Broad-leaved deciduous tree	*Salix alba* (white willow)
Tree subcanopy	Broad-leaved deciduous tree	*Populus grandidentata* (bigtooth aspen)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Herb (field)	Vine/Liana	*Toxicodendron radicans* (eastern poison ivy), *Vitis riparia* (riverbank grape)
Herb (field)	Forb	*Lythrum salicaria* (purple loosestrife)
Herb (field)	Graminoid	*Typha angustifolia* (narrowleaf cattail)

Herb (field)	Fern or fern ally	*Equisetum pratense* (meadow horsetail), *Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Lythrum salicaria* (purple loosestrife)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Purple loosestrife marsh	Edinger et al. 2002

Local Range: This association is not found within the park. It is located outside of the park boundary in the mapped area surrounding the Old Saratoga Unit.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.170
Accuracy Assessment Observations: SARA.247 (AA)
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Ruderal Wet Meadow and Marsh (M303)
Group	Northern and Central Ruderal Wet Meadow and Marsh Group (G556)
Alliance*	*Lythrum salicaria* Herbaceous Alliance (A.3030)
Alliance (English name)*	Purple Loosestrife Herbaceous Alliance
Association	*Lythrum salicaria* Herbaceous Vegetation
Association (English name)	Purple Loosestrife Herbaceous Vegetation
Ecological System(s)	Information not available.

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association consists of wetlands heavily invaded by *Lythrum salicaria* (purple loosestrife) with few or no species indicating the former more native association analog. *Lythrum* (loosestrife) makes up at least 75% of the vegetation cover and may approach 100%. The sparse associates include common wetland plants such as *Impatiens capensis* (jewelweed), *Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern), *Carex stricta* (upright sedge), and *Typha* (cattail) spp. Shrubs are sparse or absent.
Environmental Description: Information not available.
Vegetation Description: *Lythrum salicaria* makes up at least 75% of the vegetation cover and may approach 100%. The sparse associates include common wetland plants such as *Impatiens capensis* (jewelweed), *Onoclea sensibilis* (sensitive fern), *Thelypteris palustris* (eastern marsh fern), *Carex stricta* (upright sedge), and *Typha* (cattail) spp. Shrubs are sparse or absent.

Most Abundant Species: Information not available.
Characteristic Species: Information not available.
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association is known from the northeastern U.S.
States/Provinces: MA, NY
Federal Lands: NPS (Minute Man, Saratoga?)

CONSERVATION STATUS

Rank: GNA (invasive) (7-Dec-2005)
Reasons: This community represents vegetation which has invaded native wetlands. It is not a conservation priority and does not receive a conservation rank.

CLASSIFICATION INFORMATION

Status: Provisional
Confidence: 3 - Weak
Comments: This association is reserved for areas strongly dominated by *Lythrum salicaria* (purple loosestrife) and consequently without a suite of associated species that indicate the native community that formerly occupied the site.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler
References: Eastern Ecology Working Group n.d., NRCS 2004



Figure F-48. Purple Loosestrife Wetland in the Old Saratoga Unit (AA point SARA.247, NYNHP 405). 8/25/2006. NAD 1983 / UTM easting 614560, northing 4771453.

Local Name: Reed Canarygrass Eastern Marsh (CEGL006044)

SYNONYMS

USNVC English Name: Reed Canarygrass Eastern Herbaceous Vegetation
USNVC Scientific Name: *Phalaris arundinacea* Eastern Herbaceous Vegetation
USNVC Identifier: CEGL006044

LOCAL INFORMATION

Environmental Description: This seasonally flooded association occurs from low (26 m [85 feet]) to high (98 m [320 feet]) elevations in level depressions, along stream shores, and on floodplains. Soils are well-drained to poorly drained silt loams, channery silt loams, gravelly loamy sands, and mucky silty clay loams in the Hudson, Fluvaquents, Teel, Limerick-Saco complex, Rhinebeck, Bernardston, Manlius-Nassau complex, Bernardston-Manlius-Nassau complex, and Madalin Formations (NRCS 2004). Bedrock is shale, siltstone, and sandstone in the Mt. Merino and Canajoharie formations. Surrounding and adjacent natural communities can vary widely depending on past land use and landscape setting. They range from wetland forests and shrub swamps [Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575) and Common Buttonbush Shrub Swamp (CEGL006069)] to upland forests and fields [White Pine - Oak Forest (CEGL006293), White Pine Successional Forest (CEGL007944), Northeastern Modified Successional Forest (CEGL006599), Early-Successional Woodland/Forest (CEGL006303), Northeastern Old Field (CEGL006107), and Little Bluestem Old Field (CEGL006333)].

Vegetation Description: The vegetation of this common, widespread association is dominated and characterized by the tall graminoid *Phalaris arundinacea* (reed canarygrass), which can exceed 65% cover. With the exception of *Onoclea sensibilis* (sensitive fern), a fairly consistent associate, most associated species occur only sporadically and vary widely by site. They include *Solidago gigantea* (giant goldenrod), *Carex vulpinoidea* (fox sedge), *Eupatorium maculatum* (spotted joepyeweed), *Typha latifolia* (broadleaf cattail), *Leersia oryzoides* (rice cutgrass), *Centaurea jacea* (brownray knapweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Carex lacustris* (lake sedge), *Bromus inermis* (smooth brome), *Cirsium pumilum* (pasture thistle), *Carex gynandra* (nodding sedge), *Andropogon gerardii* (big bluestem), *Scirpus cyperinus* (woolgrass), *Euthamia graminifolia* (flat-top goldentop), *Asclepias syriaca* (common milkweed), *Thelypteris palustris* (eastern marsh fern), *Impatiens capensis* (jewelweed), *Juncus effusus* (common rush), *Linaria vulgaris* (butter and eggs), *Scirpus atrovirens* (green bulrush), *Boehmeria cylindrica* (smallspike false nettle), *Polygonum hydropiperoides* (swamp smartweed), *Eupatorium perfoliatum* (common boneset), *Carex trichocarpa* (hairyfruit sedge), *Galium mollugo* (false baby's breath), *Arctium lappa* (greater burrdock), *Eleocharis ovata* (ovate spikerush), *Bidens connata* (purplestem beggarticks), *Scirpus pendulus* (rufous bulrush), *Carex lurida* (shallow sedge), *Sparganium eurycarpum* (broadfruit bur-reed), *Urtica dioica* (stinging nettle), *Lythrum salicaria* (purple loosestrife), and many others. The floating aquatic *Spirodela polyrrhiza* (common duckmeat) can also be present. Tall and short shrubs are occasionally present in low abundance; species include *Lonicera tatarica* (Tatarian honeysuckle),

Cephalanthus occidentalis (common buttonbush), *Ulmus americana* (American elm), *Viburnum dentatum* (southern arrowwood), *Viburnum lentago* (nannyberry), *Rhamnus cathartica* (common buckthorn), *Cornus amomum* (silky dogwood), *Cornus racemosa* (gray dogwood), *Fraxinus pennsylvanica* (green ash), and *Sambucus nigra* (European black elderberry).

Most Abundant Species:

Stratum	Lifeform	Species
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Lonicera tatarica* (Tatarian honeysuckle)
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Forb	*Solidago gigantea* (giant goldenrod)
Herb (field)	Graminoid	*Phalaris arundinacea* (reed canarygrass)
Herb (field)	Fern or fern ally	*Onoclea sensibilis* (sensitive fern)

Characteristic Species: *Onoclea sensibilis* (sensitive fern), *Phalaris arundinacea* (reed canarygrass)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.6, SARA.40, SARA.58, SARA.62, SARA.65, SARA.70, SARA.80, SARA.85, SARA.86, SARA.102

Accuracy Assessment Observations: SARA.7 (AA), SARA.126 (AA), SARA.154 (AA), SARA.155 (AA), SARA.196 (AA), SARA.210 (AA), SARA.216 (AA), SARA.217 (AA)

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Ruderal Wet Meadow and Marsh (M303)
Group	Northern and Central Ruderal Wet Meadow and Marsh Group (G556)
Alliance*	*Phalaris arundinacea* Seasonally Flooded Herbaceous Alliance (A.1381)
Alliance (English name)*	Reed Canarygrass Seasonally Flooded Herbaceous Alliance
Association	*Phalaris arundinacea* Eastern Herbaceous Vegetation
Association (English name)	Reed Canarygrass Eastern Herbaceous Vegetation

Ecological System(s)	Central Interior Highlands and Appalachian Sinkhole and Depression Pond (CES202.018) North-Central Interior Floodplain (CES202.694) Laurentian-Acadian Wet Meadow-Shrub Swamp (CES201.582)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This association is found throughout the northeastern United States and Canada, but its distribution as a natural type is complicated elsewhere. *Phalaris arundinacea* is native to the United States and Canada but is now more widely distributed and abundant because of local introductions from both local and European populations. The introduced strains may be more aggressive ecotypes than native strains. Stands are found in both minerotrophic basin wetlands as well as rivershores. *Phalaris arundinacea* has been widely used as a forage and hay crop, especially in marshes and floodplains, and it is used for wildlife food and for shoreline and ditch stabilization. Stands are dominated by *Phalaris arundinacea* (reed canarygrass), a 0.5- to 2-m tall perennial grass, which tends to occur in monocultures or associated with *Calamagrostis canadensis* (bluejoint). Associates in the glaciated Northeast include *Viburnum nudum* (possumhaw), *Alnus incana* (gray alder) or *Alnus serrulata* (hazel alder), *Viburnum dentatum* (southern arrowwood), and *Agrostis gigantea* (redtop). In Central Appalachian bottomland old fields, characteristic associates include *Verbesina alternifolia* (wingstem) (which may be codominant), *Solidago rugosa* (wrinkleleaf goldenrod), *Boehmeria cylindrica* (smallspike false nettle), and *Euthamia graminifolia* (flat-top goldentop), along with exotic species such as *Glechoma hederacea* (ground ivy), *Coronilla varia* (purple crownvetch), *Rosa multiflora* (multiflora rose), and *Elaeagnus umbellata* (autumn olive). Midwest associates include species characteristic of wet meadows. *Phalaris arundinacea* (reed canarygrass) can displace native species over time. Further work is required to resolve the natural versus introduced nature of this type in the Southeast before a description can be completed.

Environmental Description: Stands are found in both minerotrophic basin wetlands as well as rivershores. The dominant species has been widely used as a forage and hay crop, especially in marshes and floodplains, and it is used for wildlife food and for shoreline and ditch stabilization (Barnes 1999).

Vegetation Description: Stands are dominated by *Phalaris arundinacea* (reed canarygrass), a 0.5- to 2-m tall perennial grass that is native to the United States and Canada, but which has also been introduced from European strains. The introduced strains may be more aggressive ecotypes than native strains (Barnes 1999). It tends to occur in monocultures or associated with *Calamagrostis canadensis* (bluejoint) or, less commonly, with a mixture of forbs equaling the graminoid cover. Associates in the glaciated Northeast include *Viburnum nudum* (possumhaw), *Salix* (willow) spp., *Alnus incana* (gray alder) or *Alnus serrulata* (hazel alder), *Viburnum dentatum* (southern arrowwood), *Poa palustris* (fowl bluegrass), *Mentha arvensis* (wild mint), *Leersia virginica* (whitegrass), *Lythrum salicaria* (purple loosestrife), and *Agrostis gigantea* (redtop). In Central Appalachian bottomland old fields, characteristic associates include *Verbesina alternifolia* (wingstem) (which may be codominant), *Solidago rugosa* (wrinkleleaf goldenrod), *Boehmeria cylindrica* (smallspike false nettle), and *Euthamia graminifolia* (flat-top goldentop), along with

exotic species such as *Glechoma hederacea* (ground ivy), *Coronilla varia* (purple crownvetch), *Rosa multiflora* (multiflora rose), and *Elaeagnus umbellata* (autumn olive). Midwest associates include species characteristic of wet meadows. *Phalaris arundinacea* (reed canarygrass) can displace native species over time (Apfelbaum and Sams 1987, Barnes 1999, and references therein). Further work is required to resolve the natural versus introduced nature of this type in the Southeast.

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Phalaris arundinacea* (reed canarygrass)

Characteristic Species: *Phalaris arundinacea* (reed canarygrass)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine

DISTRIBUTION

Range: This association is found throughout the northeastern United States and Canada, but its distribution as a natural type is complicated elsewhere. It currently ranges from Virginia north to Vermont, east to Minnesota and south to Tennessee.

States/Provinces: CT, DE, IA, IN, MA, MD, ME, MN, NH, NJ, NY, OH, ON, PA, RI, TN, VA, VT, WV

Federal Lands: DOD (Camp Dawson); NPS (Allegheny Portage Railroad, Delaware Water Gap, Effigy Mounds, Eisenhower, Gettysburg, Indiana Dunes, Saratoga, Saugus Iron Works, Upper Delaware); USFWS (Assabet River?, Erie, Great Meadows?, Great Swamp, Oxbow, Parker River)

CONSERVATION STATUS

Rank: GNA (invasive) (1-Dec-1997)

Reasons: *Phalaris arundinacea* (reed canarygrass) is native to the United States and Canada but is now more widely distributed and abundant because of local introductions from both local and European populations (Apfelbaum and Sams 1987). It can invade a variety of habitats.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: Type has a broad distribution; in fact, it is widespread throughout temperate areas of the northern hemisphere. It is native to the United States and Canada, but is now more widely distributed and abundant because of local introductions from both local and European populations (Apfelbaum and Sams 1987). It can invade a variety of habitats, suggesting that little unites these stands apart from the dominance of *Phalaris arundinacea* (reed canarygrass). However, that may be the only reasonable way to describe this type. This vegetation is documented from Shady Valley TNC Preserve, Johnson County, Tennessee, where it occupies channelized streams, impoundments, and fen restoration sites. In these examples, characteristic associates include *Juncus effusus* (common rush), *Carex lurida* (shallow sedge), *Carex gynandra* (nodding sedge), and *Alnus serrulata* (hazel alder).

Similar Associations:

Calamagrostis canadensis - Phalaris arundinacea Herbaceous Vegetation (CEGL005174)

Phalaris arundinacea Western Herbaceous Vegetation (CEGL001474)

Related Concepts:

Bottomland old fields (Vanderhorst 2001a) =

Palustrine Persistent Emergent Wetland (PEM1) (Cowardin et al. 1979) ?

Reed canary grass riverine grassland (Perles et al. 2004) ?

SNE low-energy riverbank community (Rawinski 1984) ?

Shallow Emergent Marsh (Thompson 1996) ?

Southern New England nutrient-poor streamside/lakeside marsh (Rawinski 1984) ?

Southern New England nutrient-rich streamside/lakeside marsh (Rawinski 1984) ?

SOURCES

Description Authors: D. Faber-Langendoen, mod. S.C. Gawler

References: Apfelbaum and Sams 1987, Barnes 1999, Cowardin et al. 1979, Edinger et al. 2002, Fike 1999, Metzler and Barrett 2001, Midwestern Ecology Working Group n.d., NRCS 2004, Perles et al. 2004, Podniesinski et al. 2006, Rawinski 1984, Sperduto 2000a, Swain and Kearsley 2001, TDNH unpubl. data, TNC and WPC 2004, Thompson 1996, Thompson and Sorenson 2000, Vanderhorst 2001a



Figure F-49. Reed Canarygrass Eastern Marsh in the Saratoga Battlefield Unit (plot SARA.102, NYNHP SF2, photo no. 555). 7/21/2004. NAD 1983 / UTM easting 612210, northing 4759397.

Local Name: Hairyfruit Sedge Wetland (CEGL006447)

SYNONYMS

USNVC English Name: Hairy-fruit Sedge Herbaceous Vegetation
USNVC Scientific Name: *Carex trichocarpa* Herbaceous Vegetation
USNVC Identifier: CEGL006447

LOCAL INFORMATION

Environmental Description: This association is located at 30 to 34 m (100-110 feet) in elevation on the flats surrounding the Kroma Kill. Soils are deep to very deep, poorly drained Fluvaquents formed in recently deposited alluvium and made up of gravelly loamy sand and silt loam (NRCS 2004). The underlying bedrock is shale and sandstone in the Canajoharie Formation. Adjacent natural communities are Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575), marsh headwater stream, and rocky headwater stream on the flats, and Early-Successional Woodland/Forest (CEGL006303), Northeastern Modified Successional Forest (CEGL006599), White Pine - Hemlock Dry-Mesic Forest (CEGL006328), Hemlock - Beech - Oak Forest (CEGL006088), Oak - Hickory / Hophornbeam / Sedge Lawn Forest (CEGL006301) in the uplands.

Vegetation Description: Vegetation Description: The vegetation of this temporarily flooded herbaceous association is characterized and dominated by *Carex trichocarpa* (hairyfruit sedge) with associates that include *Polygonum sagittatum* (arrowleaf tearthumb), *Impatiens capensis* (jewelweed), *Symplocarpus foetidus* (skunk cabbage), *Typha angustifolia* (narrowleaf cattail), *Leersia oryzoides* (rice cutgrass), *Typha latifolia* (broadleaf cattail), and *Eupatorium maculatum* (spotted joepyeweed). Additional herbs, present at lesser abundance, are *Carex stricta* (upright sedge), *Phalaris arundinacea* (reed canarygrass), *Onoclea sensibilis* (sensitive fern), *Pilea pumila* (Canadian clearweed), *Boehmeria cylindrica* (smallspike false nettle), *Lycopus americanus* (American water horehound), *Lysimachia terrestris* (earth loosestrife), and *Eupatorium perfoliatum* (common boneset). *Alnus incana ssp. rugosa* (speckled alder) is present sporadically as a tall and short shrub. A sparse (just over 6% cover) tree canopy layer consisting of *Populus tremuloides* (quaking aspen) and *Fraxinus pennsylvanica* (green ash) is also present; *Fraxinus pennsylvanica* (green ash) and *Alnus incana ssp. rugosa* (speckled alder) form a low (8 m), sparse tree subcanopy.

Most Abundant Species:

Stratum	Lifeform	Species
Tree (canopy & subcanopy)	Broad-leaved deciduous tree	*Fraxinus pennsylvanica* (green ash)
Tree canopy	Broad-leaved deciduous tree	*Populus tremuloides* (quaking aspen)
Shrub/sapling (tall & short)	Broad-leaved deciduous shrub	*Alnus incana* ssp. *rugosa* (speckled alder)
Herb (field)	Forb	*Impatiens capensis* (jewelweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Symplocarpus foetidus* (skunk cabbage)

Herb (field) Graminoid *Carex trichocarpa* (hairyfruit sedge)

Characteristic Species: *Carex trichocarpa* (hairyfruit sedge), *Impatiens capensis* (jewelweed), *Polygonum sagittatum* (arrowleaf tearthumb), *Typha angustifolia* (narrowleaf cattail), *Typha latifolia* (broadleaf cattail)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S5*	B	1	Shallow emergent marsh	Edinger et al. 2002

Local Range: This association is located on the flats surrounding the Kroma Kill in the Battlefield Unit of Saratoga National Historical Park.

Classification Comments: Information not available.

Other Comments: Information not available.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.16

Accuracy Assessment Observations: SARA.121 (AA), SARA.153 (AA)

Reference Observations: SARA.235

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Shrubland and Grassland (2)
Subclass	Temperate and Boreal Shrubland and Grassland (2.C)
Formation	Temperate and Boreal Freshwater Wet Meadow and Marsh (2.C.5)
Division	Eastern North American Freshwater Wet Meadow, Riparian, and Marsh (D030)
Macrogroup	Eastern North American Riverscour Wetland (M165)
Group	Northern and Central Riverscour Wetland Group (G194)
Alliance*	*Carex torta* Temporarily Flooded Herbaceous Alliance (A.1340)
Alliance (English name)*	Twisted Sedge Temporarily Flooded Herbaceous Alliance
Association	*Carex trichocarpa* Herbaceous Vegetation
Association (English name)	Hairy-fruit Sedge Herbaceous Vegetation
Ecological System(s)	Central Appalachian River Floodplain (CES202.608) Central Appalachian Stream and Riparian (CES202.609)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This association occurs in small patches on floodplain edges, deposition bars, and islands where tree canopy is lacking, on medium- to large-sized rivers in the mid-Atlantic region and on third- or fourth-order streams above 800 m elevation in the Central Appalachians. This community is routinely flooded during most high-water events and commonly occurs on low flats associated with the active floodplain, either directly adjacent to the channel or in association with backwater depressions and sloughs. Ice-scour during high winter flows contributes to the open physiognomy of this community. *Carex trichocarpa* (hairyfruit sedge) is the dominant species in this association. Shrubs may be present but at less than 25% cover, including *Rosa multiflora* (multiflora rose), *Cornus amomum* (silky dogwood), and *Rubus allegheniensis* (Allegheny blackberry). This

type is susceptible to invasion by *Phalaris arundinacea* (reed canarygrass). Other common herbaceous species include *Solidago gigantea* (giant goldenrod), *Boehmeria cylindrica* (smallspike false nettle), *Dichanthelium clandestinum* (deertongue), *Urtica dioica* (stinging nettle), *Polygonum* (knotweed) spp., *Scirpus cyperinus* (woolgrass), *Euthamia graminifolia var. graminifolia* (flat-top goldentop), *Verbena hastata var. hastata* (swamp verbena), *Doellingeria umbellata var. umbellata* (parasol whitetop), *Asclepias syriaca* (common milkweed), *Arisaema triphyllum* (Jack in the pulpit), *Onoclea sensibilis* (sensitive fern), and *Lilium superbum* (turk's-cap lily). Vines may be present at low cover, including *Polygonum convolvulus* (black bindweed) and *Clematis virginiana* (devil's darning needles).

Environmental Description: This association is found occasionally in small patches on floodplain edges, deposition bars, and islands where tree canopy is lacking. It occurs along medium- to large-sized rivers in the mid-Atlantic region and on third- or fourth-order streams above 800 m elevation in the Central Appalachians. This community is routinely flooded during most high-water events and commonly occurs on low flats associated with the active floodplain, either directly adjacent to the channel or in association with backwater depressions and sloughs. Ice-scour during high winter flows contributes to the open physiognomy of this community. In New Jersey and Pennsylvania, typical soils include coarse loamy to sandy, somewhat poorly to very poorly drained glacio-fluvial deposits. In West Virginia, the community occurs on moderately poorly to well-drained sandy loam or silt loam with pH averaging 4.8 (n=4), underlain by fluvial deposits including stratified sediments, cobbles, and organic inclusions. Hydric soil indicators include alluvial depleted matrix and iron/manganese masses (Byers et al. 2007).

Vegetation Description: This herbaceous floodplain prairie occurs in the mid-Atlantic region and Central Appalachians. The community is dominated by dense rhizomatous stands of *Carex trichocarpa* (hairyfruit sedge), which can tolerate annual sediment deposition and occasional high-energy ice-scour. Shrubs may be present but at less than 25% cover, including *Rosa multiflora* (multiflora rose), *Cornus amomum* (silky dogwood), and *Rubus allegheniensis* (Allegheny blackberry). This type is susceptible to invasion by *Phalaris arundinacea* (reed canarygrass). Other common herbaceous species include *Solidago gigantea* (giant goldenrod), *Boehmeria cylindrica* (smallspike false nettle), *Dichanthelium clandestinum* (deertongue), *Urtica dioica* (stinging nettle), *Polygonum* (knotweed) spp., *Scirpus cyperinus* (woolgrass), *Euthamia graminifolia var. graminifolia* (flat-top goldentop), *Verbena hastata var. hastata* (swamp verbena), *Doellingeria umbellata var. umbellata* (parasol whitetop), *Asclepias syriaca* (common milkweed), *Arisaema triphyllum* (Jack in the pulpit), *Onoclea sensibilis* (sensitive fern), *Lilium superbum* (turk's-cap lily), *Carex projecta* (necklace sedge), *Thalictrum pubescens* (king of the meadow), *Veratrum viride* (green false hellebore), *Elymus riparius* (riverbank wildrye), and *Solidago rugosa* (wrinkleleaf goldenrod). Vines may be present at low cover, including *Polygonum convolvulus* (black bindweed) and *Clematis virginiana* (devil's darning needles). Cover by nonvascular plants is insignificant. Mean species richness of vascular plants is 27 taxa per 400 square meters for 4 plots in West Virginia (Byers et al. 2007).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Graminoid	*Carex trichocarpa* (hairyfruit sedge)

Characteristic Species: *Boehmeria cylindrica* (smallspike false nettle), *Carex trichocarpa* (hairyfruit sedge), *Cornus amomum* (silky dogwood), *Dichanthelium clandestinum* (deertongue), *Solidago gigantea* (giant goldenrod)
Other Noteworthy Species: Information not available.
USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This community occurs in northern New Jersey, northeastern Pennsylvania, southeastern New York, and the Allegheny Mountains region of West Virginia.
States/Provinces: NJ, NY, PA:S3, WV:S1
Federal Lands: NPS (Delaware Water Gap, Saratoga, Upper Delaware)

CONSERVATION STATUS

Rank: G3 (15-May-2007)
Reasons: This community occurs on the upper Delaware River but not on the Susquehanna River (G. Podniesinski pers. comm.). It is critically imperiled (two occurrences, slightly threatened by *Phalaris arundinacea* (reed canarygrass) invasion) in West Virginia. Its status north and east of Pennsylvania is unknown.

CLASSIFICATION INFORMATION

Status: Standard
Confidence: 2 - Moderate
Comments: This community is described from the Delaware Water Gap, where it is distinct although often narrow and linear, and from the Central Appalachians of West Virginia. In West Virginia, it is represented by 4 plots (2 occurrences), which cluster consistently and ordinate closely, near the high-elevation riverscour and tall-herb floodplain types. Occurrence elsewhere in the northeastern U.S. needs to be documented.
Similar Associations: Information not available.
Related Concepts: Information not available.

SOURCES

Description Authors: S.C. Gawler, mod. E.A. Byers
References: Byers et al. 2007, Eastern Ecology Working Group n.d., NRCS 2004.



Figure F-50. Hairyfruit Sedge Wetland in the Saratoga Battlefield Unit (AA point SARA.153, NYNHP 306). 8/23/2006. NAD 1983 / UTM easting 612996, northing 4762133.

Local Name: Common Duckweed Herbaceous Vegetation (CEGL005451)

SYNONYMS

U.S. NVC English Name: **Duckweed species Eastern North American Aquatic Vegetation**
U.S. NVC Scientific Name: ***Lemna* spp. Eastern North American Aquatic Vegetation**
U.S. NVC Identifier: **CEGL005451**

LOCAL INFORMATION

Environmental Description: This wetland association is found at variable elevations within the park from 27 to 113 m (90-370 feet) in flat, poorly drained ponds and sloughs. Hydrology is variable; ponds can be either permanently or seasonally inundated. Soils include silt loam, channery silt loam, silty clay loam, gravelly loamy sand and muck in the Limerick-Saco complex, Bernardston, Manlius-Nassau complex, Madalin, Palms, Hudson, and Rhinebeck series (NRCS 2004). The ponds can be found in a variety of settings, from flat channel beds to steps on moderately sloping hillsides to high level areas, and they are underlain by sandstone, siltstone, and shale bedrock in the Austin Glen, Mt. Merino, and Canajoharie formations. At Saratoga National Historical Park, they are surrounded by a range of natural communities depending on their location. These communities include Early-Successional Woodland/Forest (CEGL006303), White Pine Successional Forest (CEGL007944), Common Buttonbush Shrub Swamp (CEGL006069), Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176), Eastern Cattail Marsh (CEGL006153), Northeastern Leafy Forb Marsh (CEGL006191), Dry, Rich Oak - Hickory Forest (CEGL006301), and White Pine - Oak Forest (CEGL006293).

Vegetation Description: The vegetation of this association is characterized and dominated by the floating aquatic *Lemna minor* (common duckweed), which can reach over 90% cover. Emergent aquatic species are also present at moderately low abundance, often around the pond's edges; they include *Sparganium eurycarpum* (broadfruit bur-reed), *Typha latifolia* (broadleaf cattail), *Leersia oryzoides* (rice cutgrass), *Peltandra virginica* (green arrow arum), and *Phalaris arundinacea* (reed canarygrass). The short shrub *Cephalanthus occidentalis* (common buttonbush) can also be found on the edges of the pond, particularly if it is surrounded by Common Buttonbush Shrub Swamp.

Most Abundant Species:

Stratum	Lifeform	Species
Short shrub/sapling	Broad-leaved deciduous shrub	*Cephalanthus occidentalis* (common buttonbush)
Herb (field)	Forb	*Peltandra virginica* (green arrow arum), *Sparganium eurycarpum* (broadfruit bur-reed)
Herb (field)	Graminoid	*Leersia oryzoides* (rice cutgrass), *Typha latifolia* (broadleaf cattail)
Floating aquatic	Aquatic herb (floating & submergent)	*Lemna minor* (common duckweed)

Characteristic Species: *Lemna minor* (common duckweed)
Other Noteworthy Species: Information not available.
Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S4*	B	1	Eutrophic pond	Edinger et al. 2002

Local Range: This association is located in both the Old Saratoga Unit and the Battlefield Unit at Saratoga National Historical Park as well as in the mapped areas outside the park boundary.
Classification Comments: Information not available.
Other Comments: Information not available.
Local Description Authors: G.J. Edinger and A.L. Feldmann
Classification Plots: SARA.79, SARA.157, SARA.173 (AA)
Accuracy Assessment Observations: None
Reference Observations: None
Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Aquatic Vegetation (5)
Subclass	Freshwater Aquatic Vegetation (5.B)
Formation	Freshwater Aquatic Vegetation (5.B.1)
Division	North American Freshwater Freshwater Aquatic Vegetation (D049)
Macrogroup	Eastern North American Freshwater Aquatic Vegetation (M108)
Group	Eastern North American Freshwater Aquatic Vegetation Group (G114)
Alliance*	*Lemna* spp. Permanently Flooded Herbaceous Alliance (A.1747)
Alliance (English name)*	Duckweed species Permanently Flooded Herbaceous Alliance
Association	*Lemna* spp. Eastern North American Aquatic Vegetation
Association (English name)	Duckweed species Eastern North American Aquatic Vegetation
Ecological System(s)	South-Central Interior Large Floodplain (CES202.705)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision.

GLOBAL DESCRIPTION

Concept Summary: This aquatic association of floating vegetation is known to occur throughout temperate eastern North America. *Lemna* spp. typically dominate but may be mixed with other plant taxa floating on the water surface. *Lemna*-dominated aquatic vegetation occupies wetlands that are permanently, semipermanently or seasonally flooded. These small plants may float on the water's surface or become stranded and possibly rooted during drawdown periods. Water chemistry is fresh. The standing water habitat is relatively shallow, generally less than 2-4 m (6.6-13.1 feet) and occurs as ponds, lakes, ditches, stock ponds, and backwater sloughs of river and stream channels. Standing water for much or most of the growing season is characteristic. Depth of the water is of no consequence to floating plants; they occur where the wind pushes them. The composition of examples varies across this wide distributional range. *Lemna* taxa that may be present in eastern North America include *Lemna aequinoctialis* (southwest U.S. as well as southeast U.S.), *Lemna minor* (widespread across temperate North America), *Lemna minuta* (widespread across southern U.S.), *Lemna obscura* (eastern-southeastern U.S.), *Lemna perpusilla* (eastern U.S.), *Lemna trisulca*

(widespread temperate and boreal, but not southeast U.S.), *Lemna turionifera* (widespread temperate and boreal, but not southeast U.S.), and *Lemna valdiviana* (southeast U.S., and spotty in the southwest U.S.). Other species present may include *Spirodela polyrrhiza* (widespread temperate U.S.), *Spirodela punctata* (southeastern U.S.), *Azolla mexicana, Azolla filiculoides, Wolffiella lingulata* (rare), *Wolffiella oblonga* (extreme southwest and southeast U.S.), *Wolffiella gladiata* (southeast coastal plain), *Wolffia brasiliensis* (eastern temperate U.S.), *Wolffia borealis* (west coast temperate and eastern temperate U.S., but not coastal plain), *Wolffia globosa* (eastern temperate U.S.), and *Wolffia columbiana* (eastern temperate U.S.), as well as *Riccia* spp. (aquatic liverworts). Associated rooted floating aquatics include *Potamogeton* spp., *Sagittaria* spp., or *Polygonum* spp. may also be present s. While these latter species are rooted submerged species, and technically not part of the strictly floating community, they do intermingle. Biomass can be abundant under eutrophic conditions.

Environmental Description: *Lemna*-dominated aquatic vegetation occupies wetlands that are permanently flooded, semi-permanently flooded to seasonally flooded. Water chemistry is fresh. The standing water habitat is relatively shallow, generally less than 2-4 m (6.6-13.1 feet) and occurs as ponds, lakes, ditches, stock ponds, and backwater sloughs of river and stream channels. Standing water for much or most of the growing season is characteristic. Depth of the water is of no consequence to floating plants; they occur where the wind pushes them. Community composition may change hour to hour, yet the environment, only the top few centimeters of water, is homogeneous. Biomass can be abundant under eutrophic conditions.

Vegetation Description: The composition of examples varies across the wide distributional range of this community. *Lemna* taxa that may be present in eastern North America include *Lemna aequinoctialis* (southwest U.S. as well as southeast U.S.), *Lemna minor* (widespread across temperate North America), *Lemna minuta* (widespread across southern U.S.), *Lemna obscura* (eastern-southeastern U.S.), *Lemna perpusilla* (eastern U.S.), *Lemna trisulca* (widespread temperate and boreal, but not southeast U.S.), *Lemna turionifera* (widespread temperate and boreal, but not southeast U.S.), and *Lemna valdiviana* (southeast U.S., and spotty in the southwest U.S.). Other species present may include *Spirodela polyrrhiza* (widespread temperate U.S.), *Spirodela punctata* (southeastern U.S.) *Azolla mexicana, Azolla filiculoides, Wolffiella lingulata* (rare), *Wolffiella oblonga* (extreme southwest and southeast U.S.), *Wolffiella gladiata* (southeast coastal plain), *Wolffia brasiliensis* (eastern temperate U.S.), *Wolffia borealis* (west coast temperate and eastern temperate U.S., but not coastal plain), *Wolffia globosa* (eastern temperate U.S.), and *Wolffia columbiana* (eastern temperate U.S.).

Most Abundant Species:

Stratum	Lifeform	Species
Floating aquatic	Aquatic herb (floating & submergent)	*Lemna minor* (common duckweed)

Characteristic Species: *Lemna minor* (common duckweed)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Palustrine.

DISTRIBUTION

Range: This aquatic association of floating vegetation is known to occur throughout temperate eastern North America.

States/Provinces: AL, AR, DE, FL, GA, IA, IL, IN, KS, KY, LA, MA, MD, ME, MI, MN, MO, MS, NC, ND, NE, NH, NJ, NY, OH, OK, PA, RI, SC, SD, TN, TX, UT, VA, VT, WV

Federal Lands: NPS (Roosevelt-Vanderbilt); USFWS (Iroquois, Reelfoot)

CONSERVATION STATUS

Rank: G5 (11-Jul-2013)

Reasons: If this community is found across eastern North America, it is ranked G5. Even if it is subdivided into "division-level" subunits, those are likely secure.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 2 - Moderate

Comments: It is possible that a coastal plain *Lemna* association could be recognized based on the restricted distribution of many *Lemna* spp. [see Southeastern North American Freshwater Aquatic Vegetation Group (G561)]. *Lemna* and other characteristic wetland taxa that comprise floating, submerged and aquatic rooted associations are not well-reported in the literature, but they are known to occur in the field. *Lemna* and *Azolla* will be easy to distinguish from each other; some *Lemna* taxa may be more difficult to distinguish from *Spirodela, Wolffiella,* and *Wolffia*.

Similar Associations:

- *Lemna minor* Herbaceous Vegetation (CEGL003305)

Related Concepts: Information not available.

SOURCES

Description Authors: D. Faber-Langendoen

References: Edinger et al. 2002, Schafale and Weakley 1990, Southeastern Ecology Working Group n.d.



Figure F-51. Common Duckweed Herbaceous Vegetation in the Old Saratoga Unit (plot SARA.173, NYNHP BB5, photo no. 531). 7/22/2004. NAD 1983 / UTM easting 615448, northing 4772177.

Local Name: Temperate Shale Cliffs and Talus (CEGL006535)

SYNONYMS

USNVC English Name: Hairy Beardtongue Sparse Vegetation
USNVC Scientific Name: *Penstemon hirsutus* Sparse Vegetation
USNVC Identifier: CEGL006535

LOCAL INFORMATION

Environmental Description: This shale cliff and talus community occurs in one location at Saratoga on a steep south/southwest-facing slope between 61 and 76 m (200-250 feet) in elevation. The thin soil is silt loam in the Hudson series (NRCS 2004), and the underlying bedrock (shale and sandstone in the Canajoharie Formation) contributes talus that is exposed at the surface. The cliff and talus community occurs in tight association with Shale Talus Slope Woodland (CEGL006074). Hemlock - Beech - Oak Forest (CEGL006088) covers the adjacent slopes, and there is cropland and pasture just upslope.

Vegetation Description: The tall-shrub layer (2 m) has 50% cover with *Rhus typhina* (=*Rhus hirta*) (staghorn sumac) (50%) as the most abundant species. The herbaceous layer (0.2 m) has 65% cover and *Danthonia spicata* (poverty oatgrass) (65%) as the most abundant species. The nonvascular layer has 15% cover with lichens (15%) as the most abundant species.

Most Abundant Species:

Stratum	Lifeform	Species
Tall shrub/sapling	Broad-leaved deciduous shrub	*Rhus typhina* (=*Rhus hirta*) (staghorn sumac)
Herb (field)	Graminoid	*Danthonia spicata* (poverty oatgrass)

Characteristic Species: *Danthonia spicata* (poverty oatgrass), *Rhus typhina* (=*Rhus hirta*) (staghorn sumac)

Other Noteworthy Species: Information not available.

Subnational Distribution with Crosswalk Data:

State	SRank	Rel	Conf	SName	Reference
NY	S3*	B	1	Shale cliff and talus community	Edinger et al. 2002

Local Range: This association is located in the Battlefield Unit at Saratoga National Historical Park.

Classification Comments: This association represents the sparsely vegetated small cliff face and talus slope at the base.

Other Comments: The map contains one polygon that is labeled Shale Talus Slope Woodland (CEGL006074), but that contains both that community and this association. The two are so finely interdigitated that they were not separated for mapping.

Local Description Authors: G.J. Edinger and A.L. Feldmann

Classification Plots: SARA.15

Accuracy Assessment Observations: None

Reference Observations: None

Saratoga National Historical Park Inventory Notes: Information not available.

GLOBAL INFORMATION

USNVC CLASSIFICATION

Class	Nonvascular and Sparse Vascular Rock Vegetation (6)
Subclass	Mediterranean, Temperate, and Boreal Nonvascular and Sparse Vegetation (6.B)
Formation	Temperate, and Boreal Cliff, Scree, and Rock Vegetation (6.B.2)
Division	Eastern North American Temperate Cliff, Scree, and Rock Vegetation (D051)
Macrogroup	Eastern North American Cliff, and Rock Vegetation (M111)
Group	Eastern North American Talus and Bluff Group (G340)
Alliance*	Lowland Talus Sparsely Vegetated Alliance (A.1847)
Alliance (English name)*	Lowland Talus Sparsely Vegetated Alliance
Association	*Penstemon hirsutus* Sparse Vegetation
Association (English name)	Hairy Beardtongue Sparse Vegetation
Ecological System(s)	Central Appalachian Pine-Oak Rocky Woodland (CES202.600)

* Alliance assignment as of 2007. All USNVC alliances are currently (2014) under review and revision

GLOBAL DESCRIPTION

Concept Summary: This association consists of sparse, mostly herbaceous vegetation occurring on harsh, steep, unstable shale talus and cliffs. Heat, drought and lack of soil development prevent the establishment of many species and limit the community to crevice-rooting herbaceous plants and widely scattered small trees and shrubs. Vegetation cover is variable and patchy. Typical tree species include *Quercus prinus* (chestnut oak), *Pinus strobus* (eastern white pine), *Pinus pungens* (Table Mountain pine), and *Juniperus virginiana* (eastern redcedar). Shrubs include scattered *Vaccinium pallidum* (Blue Ridge blueberry), *Rhus typhina* (staghorn sumac), *Gaylussacia baccata* (black huckleberry), and *Amelanchier arborea* (common serviceberry). The herbaceous layer ranges from absent to nearly 30% cover in patches, and consists of drought-tolerant herbs and grasses such as *Deschampsia flexuosa* (wavy hairgrass), *Comandra umbellata* (bastard toadflax), *Solidago arguta* (Atlantic goldenrod), *Baptisia tinctoria* (horseflyweed), *Woodsia obtusa* (bluntlobe cliff fern), *Woodsia ilvensis* (rusty woodsia), *Penstemon hirsutus* (hairy beardtongue), *Geranium robertianum* (Robert geranium), *Schizachyrium scoparium* (little bluestem), *Dichanthelium linearifolium* (slimleaf panicgrass), and *Carex pensylvanica* (Pennsylvania sedge).

Environmental Description: This association occurs on unstable shale talus with shallow, very well-drained soils. The parent material is shale and siltstone. The scree is very well-drained with vegetation likely experiencing droughty soil conditions for much of the growing season.

Vegetation Description: Vegetation cover is variable and patchy. Typical tree species include *Quercus prinus* (chestnut oak), *Pinus strobus* (eastern white pine), *Pinus pungens* (Table Mountain pine), and *Juniperus virginiana* (eastern redcedar). Shrubs include scattered *Vaccinium pallidum* (Blue Ridge blueberry), *Rhus typhina* (staghorn sumac), *Gaylussacia baccata* (black huckleberry), and *Amelanchier arborea* (common serviceberry). The herbaceous layer ranges from absent to nearly 30% cover in patches, and consists of drought-tolerant herbs and grasses such as *Deschampsia flexuosa* (wavy hairgrass), *Comandra umbellata* (bastard toadflax), *Solidago arguta* (Atlantic goldenrod), *Baptisia tinctoria* (horseflyweed), *Woodsia obtusa* (bluntlobe cliff fern), *Woodsia ilvensis* (rusty woodsia), *Penstemon hirsutus* (hairy beardtongue), *Geranium robertianum* (Robert

geranium), , *Schizachyrium scoparium* (little bluestem), *Dichanthelium linearifolium* (slimleaf panicgrass), and *Carex pensylvanica* (Pennsylvania sedge).

Most Abundant Species:

Stratum	Lifeform	Species
Herb (field)	Forb	*Comandra umbellata* (bastard toadflax), *Penstemon hirsutus* (hairy beardtongue), *Solidago arguta* (Atlantic goldenrod)
Herb (field)	Graminoid	*Carex pensylvanica* (Pennsylvania sedge), *Deschampsia flexuosa* (wavy hairgrass)

Characteristic Species: *Deschampsia flexuosa* (wavy hairgrass), *Juniperus virginiana* (eastern redcedar), *Pinus strobus* (eastern white pine), *Quercus prinus* (chestnut oak), *Quercus rubra* (northern red oak), *Woodsia ilvensis* (rusty woodsia), *Woodsia obtusa* (bluntlobe cliff fern)

Other Noteworthy Species: Information not available.

USFWS Wetland System: Not applicable

DISTRIBUTION

Range: This association is known from central New England and New York state south to northern New Jersey and Pennsylvania.

States/Provinces: NJ, NY, PA, VT

Federal Lands: NPS (Delaware Water Gap, Saratoga)

CONSERVATION STATUS

Rank: GNR (6-Jul-1999)

Reasons: Information not available.

CLASSIFICATION INFORMATION

Status: Standard

Confidence: 3 - Weak

Comments: This community is apparently distinct, but very poorly documented.

Similar Associations:

Quercus rubra - Quercus prinus - Pinus strobus / Penstemon hirsutus Woodland (CEGL006074)

Related Concepts:

Shale Scree Slope (Podniesinski et al. 2006) ?

Shale Talus (Thompson 1996) ?

SOURCES

Description Authors: S.C. Gawler

References: Eastern Ecology Working Group n.d., Edinger et al. 2002, NRCS 2004, Podniesinski et al. 2006, Thompson 1996, Thompson and Sorenson 2000



Figure F-52. Temperate Shale Cliffs and Talus in the Saratoga Battlefield Unit (plot SARA.15, NYNHP BS9). 7/21/2004. NAD 1983 / UTM easting 610479, northing 4759232.

Table F-1. Equivalency between U.S. National Vegetation Classification associations and New York Natural Community Types (forests and woodlands) at Saratoga National Historical Park.

U.S. National Vegetation Classification Association	New York Natural Community Type equivalent
Shale Talus Slope Woodland (CEGL006074)	Shale Talus Slope Woodland
Dry, Rich Oak-Hickory Forest (CEGL006301)	Appalachian Oak-Hickory Forest
Northeastern Dry Oak-Hickory Forest (CEGL006336)	
Mesic Sugar Maple - Ash - Oak -Hickory Forest (CEGL006046)	
Black Locust Successional Forest (CEGL007279)	Successional Southern Hardwoods
Northeastern Modified Successional Forest(CEGL006599)	
Early-Successional Woodland/Forest (CEGL006303)	Successional Northern Hardwoods
Eastern White Pine Successional Forest (CEGL007944)	
Northeastern Oak-Red Maple Successional Forest (CEGL006506)	
White Pine Plantation (CEGL007178)	Pine Plantation
Norway Spruce Plantation (CEGL007167)	Spruce-Fir Plantation
Hemlock-Beech-Oak Forest (CEGL006088)	Hemlock-Northern Hardwood Forest
Hemlock-Northern Hardwood Forest (CEGL006109)	
White Pine - Hemlock Dry-Mesic Forest (CEGL006328)	
White Pine - Oak Forest (CEGL006293)	Appalachian oak-pine Forest
Red Oak-Northern Hardwood Forest (CEGL006173)	Beech-Maple Mesic Forest
Beech - Maple Glaciated Forest (CEGL005013)	
Northern Hardwood - White Pine Forest (CEGL005005)	Pine-Northern Hardwood Forest
Semi-rich Northern Hardwood Forest (CEGL006211)	Maple-Basswood Rich Mesic Forest
Box-elder Floodplain Forest (CEGL005033)	Floodplain Forest
Green Ash - Mixed Hardwood Floodplain Forest (CEGL006575)	
Silver Maple - Elm Floodplain Forest (CEGL006001)	
Silver Maple / Sensitive Fern Floodplain Forest (CEGL006176)	
Silver Maple Floodplain Levee Forest (CEGL006147)	
Terrace Hardwood Floodplain Forest (CEGL006114)	
Swamp White Oak Floodplain Forest (CEGL006386)	
Upland/Wetland Transitional Forest (CEGL006000)	Red Maple-Hardwood Swamp
Elm - Ash / Skunk Cabbage Swamp (CEGL006966)	
Red Maple - Lake Sedge Wooded Marsh (CEGL006105)	
Southern New England Red Maple Seepage Swamp (CEGL006406)	

Table F-2. Equivalency between U.S. National Vegetation Classification associations and New York Natural Community Types (non-forested vegetation)

U.S. National Vegetation Classification Association	New York Natural Community Type equivalent
Bracken Grassland (CEGL005142)	Successional Fern Meadow
Little Bluestem Old Field (CEGL006333)	Successional Old Field
Northeastern Old Field (CEGL006107)	
Northeastern Successional Shrubland (CEGL006451)	Successional Shrubland
Eastern Woodland Vernal Pool (CEGL006453)	Vernal Pool
Skunk Cabbage -Orange Jewelweed Seep (CEGL006567)	Intermittent Stream
Lake Sedge Wet Meadow (CEGL002256)	Shallow Emergent Marsh
Mixed Forb Marsh (CEGL006446)	
Seasonally Flooded Mixed Graminoid Meadow (CEGL006519)	
Steeplebush / Reed Canarygrass Successional Wet Meadow (CEGL006571)	
Woolgrass Marsh (CEGL006349)	
Eastern Cattail Marsh (CEGL006153)	
Northeastern Leafy Forb Marsh (CEGL006191)	
Rice Cutgrass - Fowl Mannagrass Wet Meadow (CEGL005106)	
Wild Rice Marsh (CEGL002382)	
Reed Canarygrass Eastern Marsh (CEGL006044)	
Hairyfruit Sedge Wetland (CEGL006447)	
Speckled Alder Swamp (CEGL002381)	Shrub Swamp
Northeastern Buttonbush Shrub Swamp (CEGL006069)	
Eastern Reed Marsh (CEGL004141)	Reedgrass Marsh
Purple Loosestrife Wetland (CEGL006403)	Purple Loosestrife Marsh
Common Duckweed Herbaceous Vegetation (CEGL005451)	Eutrophic Pond
Temperate Shale Cliffs and Talus (CEGL006535)	Shale Talus Slope Woodland

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